LISTEN.
THINK.
SOLVE.℠

**SIZE FOR SIZE...
BEST VALUE IN
THE INDUSTRY**

SELECTION GUIDE FOR
SMC™-FLEX AND SMC™-3

ALLEN-BRADLEY • ROCKWELL SOFTWARE

Rockwell Automation

Allen-Bradley

SMART MOTOR CONTROLLERS...

PROVIDING UNMATCHED INTELLIGENT MOTOR CONTROL

SMC-Flex and SMC-3

Manufacturers need to get their products to market faster, more efficiently, and with a higher degree of consistency. The Allen-Bradley SMC soft starters are designed to provide integrated features and functionality to help you conserve power and minimize manufacturing risks – while reaping the most productivity from your plant floor.

The flexibility and capabilities of the SMC-Flex and SMC-3 make them ideal for virtually any application. They can minimize mechanical wear resulting from full-voltage starting of AC induction motors, enabling longer system life as well as limit line disturbances from inrush currents, resulting in reduced downtime. The SMC intelligent motor control devices combine data-driven, networked motor control and industry leading protection for improved motor and system performance. With the available options, functionality, and application capabilities, they are unmatched in the industry.

SMC-FLEX – MODULAR AND COMPACT SOFT STARTER

The SMC-Flex reduces both product size and is a cost-effective package for your production applications. As standard, the SMC-Flex includes I/O, electronic overload, integral bypass, advanced communication capabilities, motor starting capabilities for both star-delta and standard squirrel-cage induction motors, advanced protection and diagnostics.

The SMC-Flex is also available for medium voltage applications with the same features and benefits for controlling motors rated up to 7.2 kV and 7500 hp (5600 kW).

SMC-3 – A SMART AND COMPACT SOFT STARTER

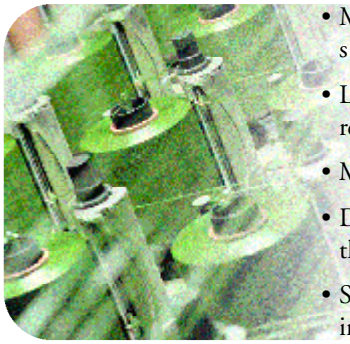
The SMC-3 provides increased intelligence in a compact footprint. Downtime is decreased due to advanced protection of motor winding equipment and materials.

As standard, this true three-phase controlling device includes electronic overload protection with adjustable trip class, integral bypass, increased motor and system diagnostics, motor starting capabilities for both star-delta and standard squirrel-cage induction motors, configurable auxiliary contacts, and multiple START and STOP modes.

At Rockwell Automation, helping your business succeed and grow is what we do best – with power, control and information systems and services designed to give you a competitive advantage in today's marketplace.

WHY USE SMART MOTOR CONTROLLERS (SMCs)?

SMCs PROVIDE MANY FEATURES TO BENEFIT YOUR SYSTEM:



- Minimize mechanical damage resulting from full-voltage starting of AC induction motors, enabling longer system life
- Limit line disturbances from inrush currents, resulting in reduced downtime
- Multiple START/STOP modes increase functionality
- Diagnostic monitoring helps prevent problems before they occur
- Satisfy electrical distribution restrictions by reducing inrush currents

SMCs ARE IDEAL FOR APPLICATIONS WHERE:

- Belts, gears, and chains can be damaged by across-the-line starting
- Materials can be damaged by sudden starts and stops
- A step change in torque can damage equipment
- Power company line current restrictions are imposed
- Space is a premium and enclosure size must be minimized
- Solid-state starting is needed for a Star-Delta motor application

WITH SMC SOFT STARTERS YOU BENEFIT FROM:

- Advanced diagnostics, increasing system performance
- Compact, space-saving footprint
- Greater product functionality for increased system flexibility
- Decreased downtime due to advanced protection of motor winding, equipment, and materials
- Greater system operation accuracy due to improved technology
- Ease of purchasing, installation, setup and maintenance

"Installation and commission time were greatly reduced with the ability to put the soft starter on the network. It is a very simple setup that works very well."

– Bradley Allen Johnson
President
BDI Engineering, Inc.

SMC-FLEX

MODULAR DESIGN

CURRENT RANGE

Product Rating	Line Current	Delta Current
5	5	9
25	25	43
43	43	74
60	60	104
85	85	147
108	108	187
135	135	234
201	201	348
251	251	435
317	317	549
361	361	625
480	480	831
625	625	850
780	780	900
970	970	1200
1250	1250	1600

VOLTAGE RANGE

200…690V AC, 50/60 Hz

CONTROL VOLTAGE

100…240V AC or 24V AC/DC (5…480)
110…120V AC (625…1250)
230…240V AC (625…1250)

STARTING MODES

	Standard	Pump Control	Braking Control
Soft Start	X	X	X
Soft Stop	X		
Current Limit	X	X	X
Full Voltage	X	X	X
Kick Start	X	X	X
Preset Slow Speed	X		X
Linear Speed Start and Stop	X		
Dual Ramp	X		
Pump Start and Stop		X	
Smart Motor Braking™			X
Accu-Stop™			X
Slow Speed with Braking			X

FEATURES

Overload

- Flexibility in Trip Class (10, 15, 20, 30, OFF)
- Reset Operation (Manual or Automatic)

Diagnostics

- PTC
- Power Loss
- Undervoltage
- Open Gate
- Ground Fault
- Voltage Imbalance
- Overvoltage
- Overload
- Line Fault
- Phase Reversal
- Overtemperature
- Excessive Starts per Hour

Motor Control

- Standard Squirrel-Cage Induction Motor
- Star-Delta Motor

Communication

- DeviceNet™, ControlNet™, EtherNet™, Remote I/O, RS-485, Profibus™, Interbus™

Metering

- Three-phase Currents
- Power in kW*
- Motor Thermal
- Capacity Usage
- Three-phase Voltages
- Power Usage in kWH*
- Power Factor of the Running Motor
- Elapsed Time of Motor Operation

I/O

- 2 Inputs
- 4 User Configurable Auxiliary Contacts

* Depends on frame size: kW or MW, kWH or MWH

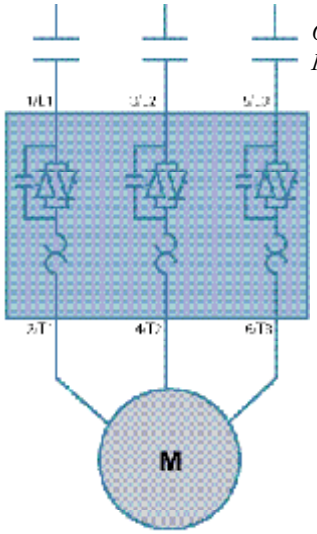
The SMC-Flex provides intelligence, unmatched performance, flexibility, diagnostics, and communication in a modular compact design for controlling either a standard squirrel-cage induction motor or a star-delta motor.

COMPACT SIZE

The SMC-Flex integrates a bypass to minimize heat generation during run time. The bypass automatically closes when the motor reaches its nominal speed, resulting in a cooler-running component and reduction in enclosure size.

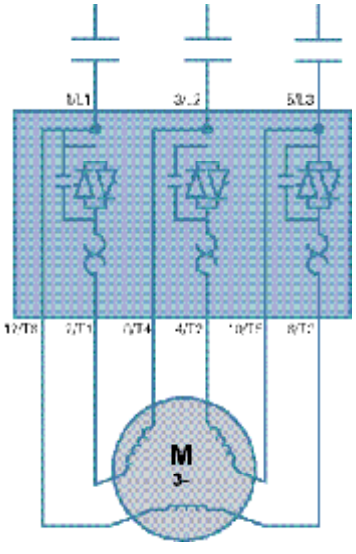
MOTOR CONNECTION

Line Connection



Optional Line Side Isolation Contactor

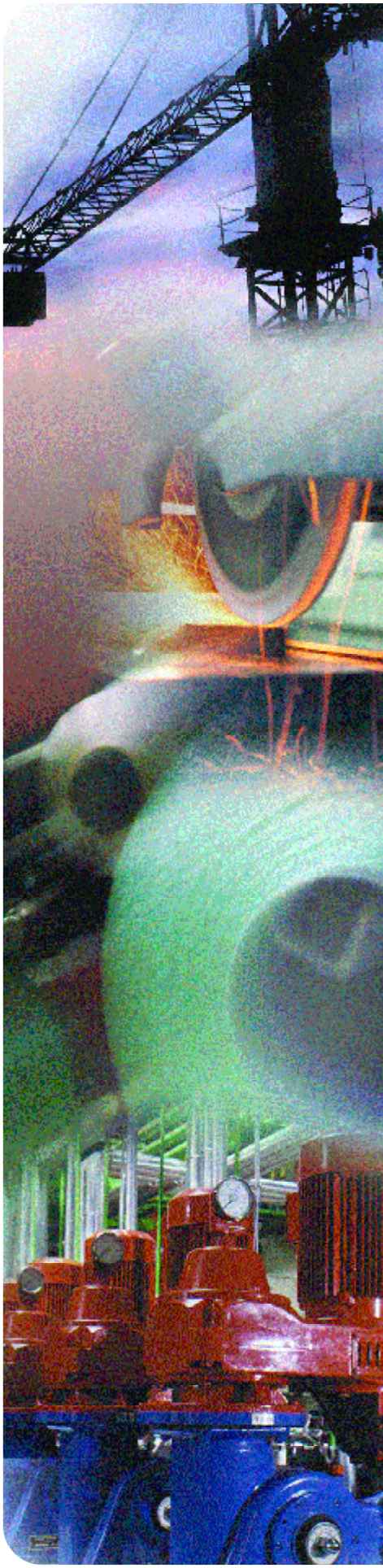
Delta Connections



UNSURPASSED ADVANTAGES

FEATURES	BENEFITS
Built-in Overload	• Multiple overload trip class selection • Less products to inventory • Ease of selection • Ease of setup • Reduced footprint
Integral Bypass	• Reduced footprint • Minimal heat loss • Reduced enclosure size • Reduced total cost
Flexible Communication Option	• Reduction in inventory • Cost savings
Configurable Auxiliary Contacts	• Flexibility of system configuration • No external components to purchase • Less product to inventory
Full Metering and Diagnostics	• Built-in power monitoring • Takes mystery out of motor operation • No additional investment required • Minimize panel space
LCD Display	• Minimal parameters to set up • Ease of setup • Ease of operation • Multilingual for a diverse workforce
Product Modularity	• Ease of maintenance

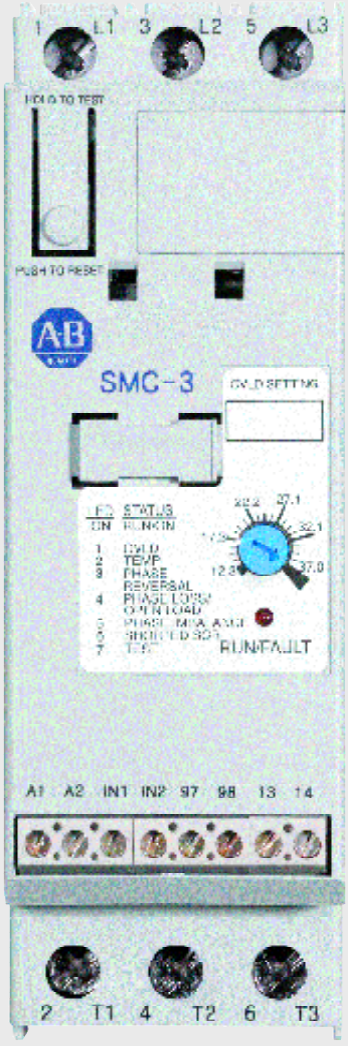
AUXILIARY CONTACT NUMBER	CONFIGURABLE TO:
#1, #2, #3, #4	Normal/Up-to-speed/External bypass/ Fault/Alarm/Network Control
	N.O./N.C.



SMC-3

SMALLEST FOOTPRINT IN THE INDUSTRY

The SMC-3 provides 3 Phase Control and unmatched performance in a compact design for your standard squirrel cage or STAR-Delta induction motors. It features microprocessor-controlled electronic overload with adjustable trip class, motor and system diagnostics, configurable auxiliary contacts, and multiple START and STOP modes. All of these combined features provide a highly accurate, reliable, and efficient smart motor controller with the smallest footprint in the industry.



Actual Size 1...37 A (45 mm)

Actual Size 43...85 A (72 mm)

CURRENT RANGE

Product Rating	Line Current	Delta Current
3	3	5
9	9	16
16	16	28
19	19	33
25	25	43
30	30	52
37	37	64
43	43	74
60	60	104
85	85	147
108	108	187
135	135	234
201	201	348
251	251	435
317	317	549
361	361	625
480	480	831

VOLTAGE RANGE

200…600V AC 50/60Hz

CONTROL VOLTAGE

100…240V AC or 24V AC/DC

STARTING MODES

Soft Start, Kick Start, Current Limit Start, or Soft Stop

FEATURES

Overload Protection

- Flexibility in trip class (10, 15, 20 or OFF)
- Selectable overload reset (Manual or Automatic)

FAULT Diagnostics

- Overtemperature in power section
- Phase reversal (selectable)
- Phase loss / Open load
- Phase imbalance
- Shorted SCRs

Configurable Auxiliary Contacts and Motor Control

- Full 3-phase control
- Standard squirrel cage induction motor or Star-Delta motors

Typical Applications

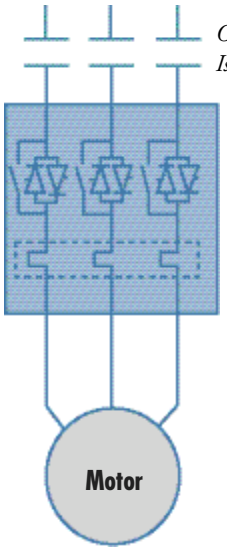
- Compressors
- Fans
- Conveyors
- Lifts
- Chillers
- Pumps

FEATURES

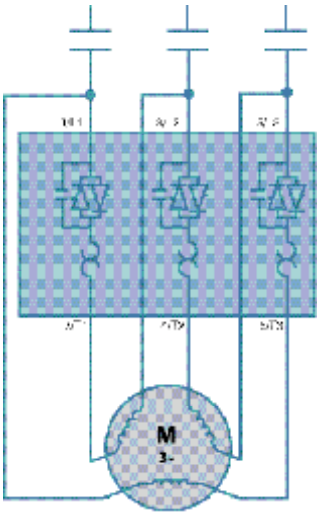
Overload

- Built-in Overload
- True 3-Phase Control
- Advanced Diagnostics
- Digital Adjustments
- Add-on Configurable Auxiliary Contacts

Line Connection



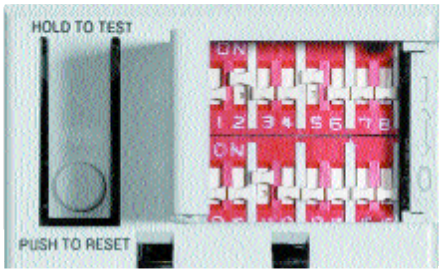
Delta



COMPACT SIZE WITH TRUE 3-PHASE CONTROL

The SMC-3 integrates a bypass to minimize heat generation during run time. The bypass automatically closes when t h e motor reaches its nominal speed, resulting in a cooler-running component and reduction in enclosure size.

UNSURPASSED ADVANTAGES

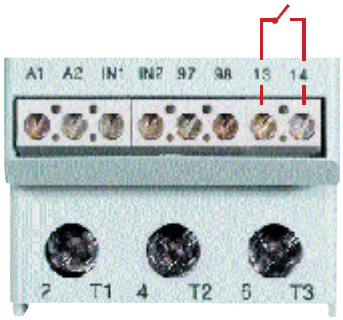


EASY AND SECURE SETUP

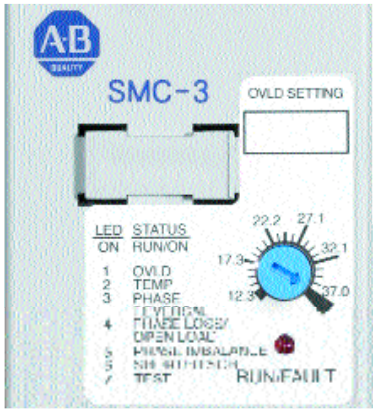
- DIP switches allow for easy, precise, and secure setting of the START/STOP profile, overload, connection type, trip class, and auxiliary contact characteristics.
- The motor FLC setting is easily accomplished using the rotary pot located on the front of the device.

CONFIGURABLE AUXILIARY CONTACTS

As standard, the SMC-3 provides a configurable (Normal or Up-to-Speed) normally open (N.O.) auxiliary contact for motor run status indication.

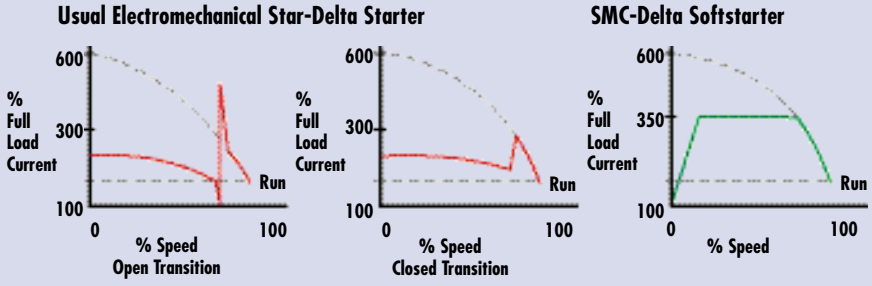


The SMC-3 has a line of side-mount configurable (Normal or Up-to-Speed) auxiliary contacts, allowing you more flexibility than ever before in your smart motor controller application.



LED DISPLAY

An LED display clearly relays device status information including RUN, FAULT diagnostics, and OFF.



TRANSITIONLESS MOTOR STARTING – ELIMINATE SWITCHING NOISES AND CURRENT SURGES

The SMC-Delta utilizes a current limit starting method to eliminate the current transition point found in star-delta applications. This greatly reduces the mechanical and electrical shock to your system and is especially important when power supplies are limited.

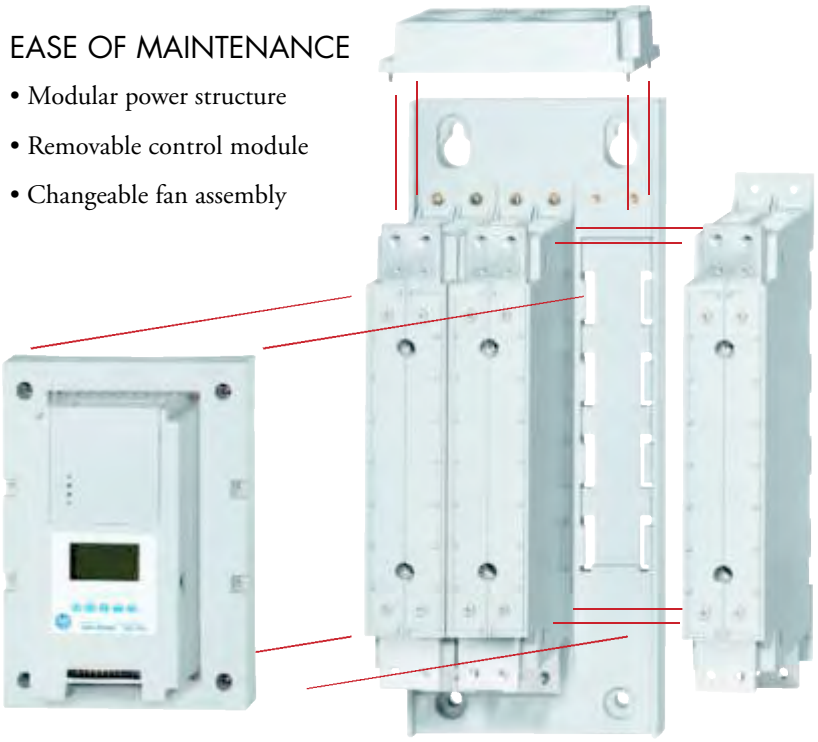
SMC-FLEX

MODULAR BY DESIGN FOR INSTALLATION AND COMMISSIONING

Catalog #
150-F251NBD
Illustrated

EASE OF MAINTENANCE

- Modular power structure
- Removable control module
- Changeable fan assembly



Control module

Power structure

PROTECTION

- Power termination covers – IP2X
- Protection is dead front (IP2X)

ADVANCED DIAGNOSTICS

- PTC Input
- Ground Fault Detection –
  additional current transformer required –
  Catalog Number 825-CBCT or Flex-Core
  126-252 depending on frame sizes

COMMUNICATION

The Allen-Bradley family of 20-COMM DPI communication interfaces allows the SMC-Flex to be connected to multiple network types including DeviceNet, ControlNet, EtherNet, Remote I/O, RS-485, Modbus, Profibus and Interbus. All connections are built into the SMC-Flex so no additional panel space is required.

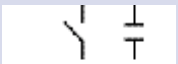
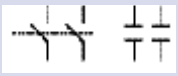
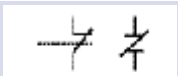
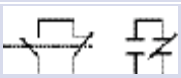
SMC-3

MODULARIZING ACCESSORIES FOR THE SMC-3

FLEXIBLE AND CONFIGURABLE AUXILIARY CONTACTS

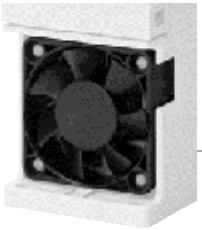
- Easy-to-mount side-mount auxiliary contact blocks
- Available in a variety of contact combinations

AVAILABLE CONFIGURATIONS

	IEC	NEMA
• 1-N.O.		
• 2-N.O.		
• 1-N.C.		
• 1-N.O. & 1-N.C.		

PROTECTED FOR BEST PERFORMANCE

Optional MOV protective modules prevent damage from transient voltages.



REDUCE TEMPERATURE, INCREASE DUTY CYCLE

- Optional fan is useful if an application requires an increased duty cycle
- Snap-on fan module runs silently and is easy to install
- Fan is installed as standard for 43... 135 A SMC-3

BUILD A MODULAR CONTROL SYSTEM

- With widths of 45 mm, 72 mm, or 200 mm the SMC's fit perfectly with the compact components of the MCS Plus product line
- The smart motor controllers match the MCS Plus products in performance, size, and design
- The MCS Plus system allows you to build more starters in less panel space, providing unparalleled performance in a minimal area

.

REMOTE RESET SOLENOID

The Bulletin 193 remote reset solenoid allows you the ability to reset a fault from a remote location.

SMCs

IDEAL FOR A WIDE RANGE OF APPLICATIONS

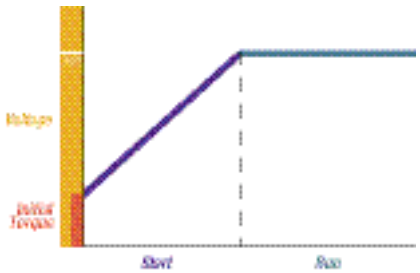
Allen-Bradley SMCs provide innovative starting and stopping solutions for ample design flexibility with minimal control module options meeting the needs of most production applications. To help identify which start and stop profiles, described in the following pages, are included in each control module option, use the following code:

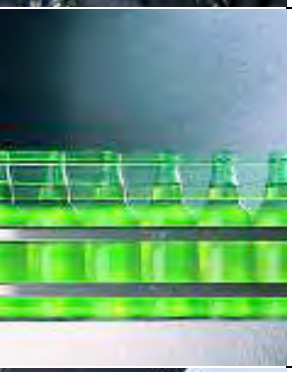
● **SMC-Flex, Standard** ▲ **SMC-Flex, Pump Control** ■ **SMC-Flex, Braking Control** ◆ **SMC-3**

SOFT START

By reducing starting torque surges, Soft Start provides smooth, stepless motor acceleration while minimizing damage to gears, couplings and belts.

● ▲ ■ ◆

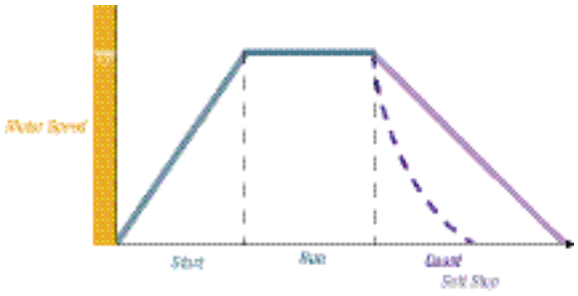




SOFT STOP

The Soft Stop option extends the stopping time to minimize load shifting or spillage.

● ◆

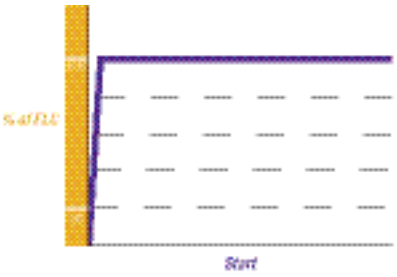


CURRENT LIMIT START

Current Limit starting is designed for applications that require the in-rush current to be limited during acceleration.

Note: Selectable Kickstart is also available with the Current Limit Start.

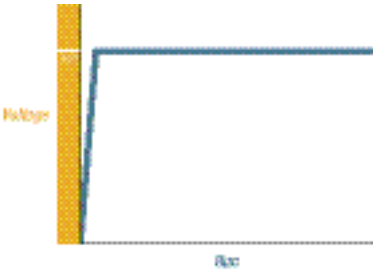
● ▲ ■ ◆

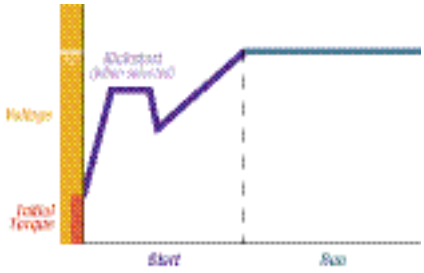


FULL-VOLTAGE START

In the Full-Voltage Start mode, the SMC performs like a solid-state contactor, achieving full in-rush current and locked rotor torque.

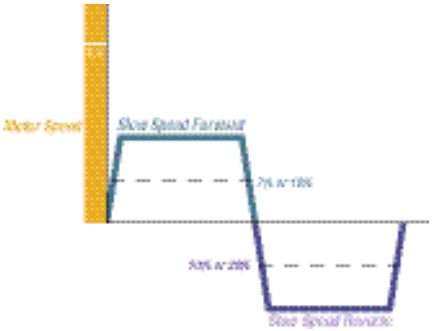
● ▲ ■





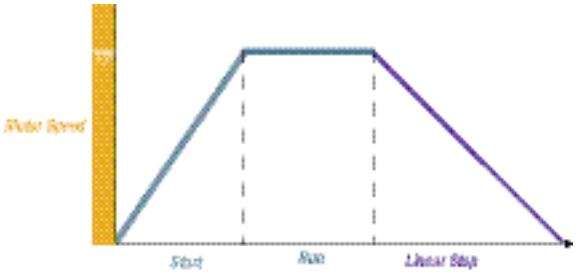
KICK START WITH SOFT START

Activate the Selectable Kickstart function to provide an extra pulse of torque. This optional feature is ideal for overcoming stiction wherever high-friction loads are encountered.



PRESET SLOW SPEED

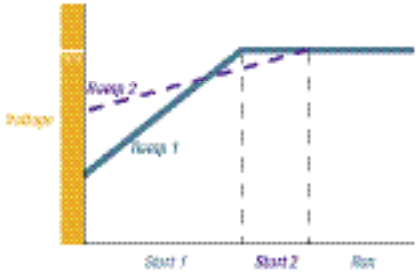
The Preset Slow Speed option furnishes two jog speeds to facilitate process setup and alignment. These speeds are available in both the forward and reverse direction without a reversing contactor.



LINEAR SPEED START AND STOP

With this type of acceleration mode, a closed-loop feedback system maintains the motor acceleration at a constant rate. The required feedback signal is provided by a DC tachometer coupled to the motor (tachometer supplied separately).

Note: This mode is also available with Kickstart.



DUAL RAMP START

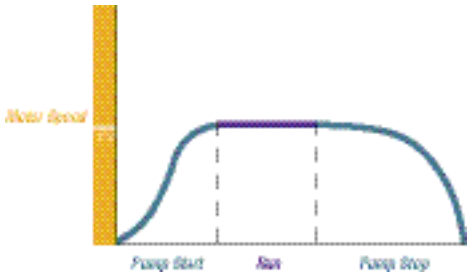
Available exclusively on the SMC Flex controller, Dual Ramp Start allows you to choose between two separate Start profiles with independently adjustable ramp times and torque settings. It's designed for applications with varying loads, two-speed requirements and reversing.

SMCs

IDEAL FOR A WIDE RANGE OF APPLICATIONS

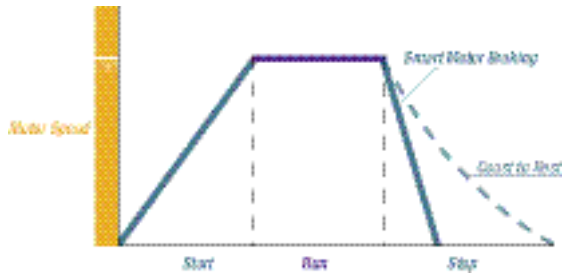
PUMP START AND STOP

The SMC controller's unique, interactive Pump Control is designed to reduce fluid surges in pumping systems. It provides closed-loop acceleration and deceleration control of centrifugal pump motors without need for feedback devices.



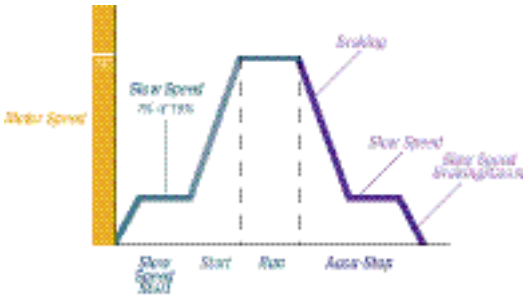
SMB™ SMART MOTOR BRAKING

SMB Smart Motor Braking stops a motor quickly for improved operation cycle times and increased productivity. Braking control with automatic zero speed shutoff is fully integrated into the controller's compact design.



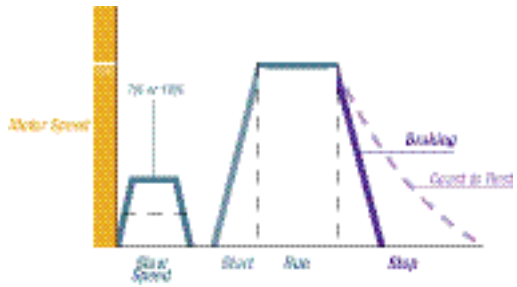
ACCU-STOP™ POSITION CONTROL

Accu-Stop position control provides rapid braking to a slow speed and then braking to a stop. This option facilitates cost-effective general positioning control.



SLOW SPEED W/BRAKING

Slow Speed with Braking combines the benefits of SMB Smart Motor Braking and Preset Slow Speed for applications requiring slow setup speeds and braking to a full stop.

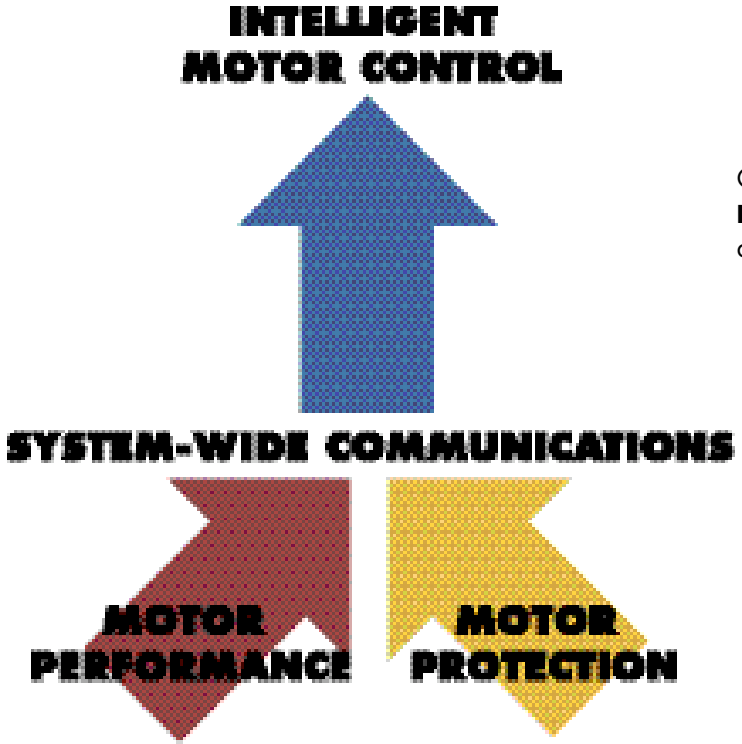


Additional Products Available – Selection Guide Chart

STC™ Starting Torque Controller	SMC Dialog Plus™ Controller
150-SG001-US-P	

For more information, please visit ***www.ab.com***

MODULARITY. FUNCTIONALITY. SIZE.



Our Complete Portfolio of
Intelligent Motor Control Products,
as part of a truly integrated architecture…

…simplifies your start-up

…reduces your installed cost

…makes it easier for you to access
essential plant and production data

Bulletin 150 — Reduced Voltage Starters

	SMC Flex Controller	SMC-3 Controller
Features	200…690V 1…1250 A	200…600V 1…480 A
Soft Start	S	S
Kickstart	S	S
Current Limit	S	S
Dual Ramp Start	S	—
Full Voltage	S	—
Soft Stop	S	S
Pump Control	O	—
Preset Slow Speed	S	—
Linear Speed	S	—
SMB™ Smart Motor Braking	O	—
Accu-Stop™	O	—
Slow Speed with Braking	O	—
Motor Protection	S	S
Communication	S	—
Metering	S	—
Keypad Programming/ LCD Display	S	—
Inside Delta Connection	S	S
Product Selection	**Page 16**	**Page 40**

S = Standard Feature
O = Optional Feature

Bulletin 150 — SMC Flex Smart Motor Controller

The SMC Flex controller provides microprocessor controlled starting for standard 3-phase squirrel-cage induction or Wye-Delta (6-lead) motors. Seven standard modes of operation are available within a single controller.

- 1…1250 A Range
- Seven Standard Start Modes
- Options Include Pump Control and Braking Control

Features

- Built in SCR Bypass/Run Contactor
- Built in Electronic Motor Overload Protection
- CT on each Phase
- Metering
- DPI Communication
- LCD Display
- Keypad Programming
- Four Programmable Auxiliary Contacts

The SMC Flex controller is available for motors rated 1…1250 A; 200…480V AC, 200…600V AC, or 230…690V AC, 50/60 Hz. In addition to motors, the SMC Flex controller can be used to control resistive loads.

Table of Contents

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Accessories 31
Specifications 33
Approximate Dimensions and Shipping Weights 38

Standards Compliance/Approvals

- UL 508
- EN/IEC 60947-4-2
- cULus Listed (open type) File No. E96956
- CE Marked (open type) per EMC Directive and Low Voltage Directive
- CCC (108…480 A)

Modes of Operation

The SMC Flex controller provides the following modes of operation as Standard:

Soft Start

This method covers the most general applications. The motor is given an initial torque setting, which is user adjustable. From the initial torque level, the output voltage to the motor is steplessly increased during the acceleration ramp time, which is user adjustable.

Selectable Kickstart

The kickstart feature provides a boost at startup to break away loads that may require a pulse of high torque to get started. It is intended to provide a current pulse, for a selected period of time.

Current Limit Start

This method provides current limit start and is used when it is necessary to limit the maximum starting current. The starting current is user adjustable. The current limit stating time is user adjustable.

Dual Ramp Start

This starting method is useful on applications with varying loads, starting torque, and start time requirements. Dual Ramp Start offers the user the ability to select between two separate start profiles with separately adjustable ramp times and initial torque settings.

Full Voltage Start

This method is used in applications requiring across-the-line starting. The SMC controller performs like a solid-state contactor. Full inrush current and locked-rotor torque are realized. The SMC may be programmed to provide full voltage start in which the output voltage to the motor reaches full voltage in 1/4 second.

Linear Speed Acceleration

With this type of acceleration mode, a closed-loop feedback system maintains the motor acceleration at a constant rate. The required feedback signal is provided by a DC tachometer coupled to the motor (tachometer supplied by user 0…5V DC, 4.5V DC = 100% speed). Kickstart is available with this mode.

Preset Slow Speed

This method can be used on applications that require a slow speed for positioning material. The Preset Slow Speed can be set for either Low, 7% of base speed, or High, 15% of base speed. Reversing is also possible through programming. Speeds provided during reverse operation are Low, 10% of base speed, or High, 20% of base speed.

Soft Stop*

The Soft Stop option can be used in applications requiring an extended stop time. The voltage ramp down time is use adjustable from 0 to 120 seconds. The load will stop when the voltage drops to a point where the load torque is greater than the motor torque.

Optional Modes of Operation

Pump Control - Start and Stop*

This option is used to reduce surges during the starting and stopping of a centrifugal pump by smoothly accelerating and decelerating the motor. The microprocessor analyzes the motor variables and generates commands which control the motor and reduce the possibility of surges occurring in the system. The pump control module also provides a built-in anti-backspin timer.

Braking Control

SMB Smart Motor Braking*

This option provides motor braking for applications that require the motor to stop faster than a coast to rest. Braking control, with automatic zero speed shut off, is fully integrated into the compact design of the SMC controller. This design facilitates a clean, straight forward installation and eliminates the requirement for additional hardware such as braking contactors, resistors, timers, and speed sensors. The microprocessor based braking system applies braking current to a standard squirrel-cage induction motor. The strength of the braking current is programmable from 150…400% of full-load current.

Accu-Stop*

This option is used in applications requiring controlled position stopping. During stopping, braking torque is applied to the motor until it reaches preset slow speed (7% or 15% of rated speed) and holds the motor at this speed until a stop command is given. Braking torque is then applied until the motor reaches zero speed. Braking current is programmable from 0…400% of full-load current. Slow Speed Current is programmable from 0…450% of full-load current. Slow speed can be programmed for either 7% (low) or 15% (high).

Slow Speed with Braking*

Slow Speed with Braking is used on applications that require slow speed (in the forward direction) for positioning or alignment and also require braking control to stop. Slow speed adjustments are 7% (low) or 15% (high) of rated speed. Slow speed acceleration current is adjustable from 0…450%. Slow speed running current is adjustable from 0…450% of full-load current. Braking current is adjustable from 0…400%.

* Not intended to be used as an emergency stop. Refer to the applicable standards for emergency stop requirments.

Description of Features

Electronic Motor Overload Protection
The SMC Flex controller incorporates, as standard, electronic motor overload protection. This overload protection is accomplished electronically with an I^2t algorithm.
When coordinated with the proper short circuit protection, overload protection is intended to protect the motor, motor controller, and power wiring against overheating caused by excessive overcurrent. The SMC Flex controller meets applicable requirements as a motor overload protective device.
The controller's overload protection is programmable, providing the user with flexibility. The overload trip class consists of either OFF, 10, 15, 20 or 30 protection. The trip current is programmed by entering the motor full-load current rating, service factor, and selecting the trip class.
Thermal memory is included to accurately model motor operating temperature. Ambient temperature insensitivity is inherent in the electronic design of the overload.

Stall Protection and Jam Detection
Motors can experience locked-rotor currents and develop high torque levels in the event of a stall or a jam. These conditions can result in winding insulation breakdown or mechanical damage to the connected load. The SMC Flex controller provides both stall protection and jam detection for enhanced motor and system protection. Stall protection allows the user to program a maximum stall protection delay time from 0…10 seconds. The stall protection delay time is in addition to the programmed start time and begins only after the start time has timed out. If the controller senses that the motor is stalled, it will shut down after the delay period has expired. Jam detection allows the user to determine the motor jam detection level as a percentage of the motor's full-load current rating. To prevent nuisance tripping, a jam detection delay time, from 0.0…99.0 seconds, can be programmed. This allows the user to select the time delay required before the SMC Flex controller will trip on a motor jam condition. The motor current must remain above the jam detection level during the delay time. Jam detection is active only after the motor has reached full speed.

Underload Protection
Utilizing the underload protection of the SMC Flex controller, motor operation can be halted if a drop in current is sensed.
The SMC Flex controller provides an adjustable underload trip setting from 0…99% of the programmed motor full-load current rating with an adjustable trip delay time of 0…99 seconds.

Undervoltage Protection
The SMC Flex controller's undervoltage protection will halt motor operation if a drop in the incoming line voltage is detected.
The undervoltage trip level is adjustable as a percentage of the programmed line voltage, from 0…99%. To eliminate nuisance trips, a programmable undervoltage trip delay time of 0…99 seconds can also be programmed. The line voltage must remain below the undervoltage trip level during the programmed delay time.

Overvoltage Protection
If a rise in the incoming line voltage is detected, the SMC Flex controller's overvoltage protection will halt motor operation.
The overvoltage trip level is adjustable as a percentage of the programmed line voltage, from 0…199%. To eliminate nuisance trips, a programmable overvoltage trip delay time of 0…99 seconds can also be programmed. The line voltage must remain above the overvoltage trip level during the programmed delay time.

Voltage Unbalance Protection
Voltage unbalance is detected by monitoring the 3-phase supply voltage magnitudes in conjunction with the rotational relationship of the three phases. The controller will halt motor operation when the calculated voltage unbalance reaches the user-programmed trip level.
The voltage unbalance trip level is programmable from 0…25% unbalance.

Excessive Starts Per Hour
The SMC Flex controller allows the user to program the allowed number of starts per hour (up to 99). This helps eliminate motor stress caused by repeated starting during a short time period.

Metering
Power monitoring parameters include:

- 3-phase current
- 3-phase voltage
- Power in kW or mW
- Power usage in kWH or mWH
- Power Factor
- Motor thermal capacity usage
- Elapsed time
-

Note: The motor thermal capacity usage allows the user to monitor the amount of overload thermal capacity usage before the SMC Flex controller's built-in electronic overload trips.

Built-in DPI Communication Capabilities
A serial interface port is provided as standard, which allows connection to a Bulletin 20 Human Interface Module and a variety of Bulletin 20-COMM Communication Modules. This includes Allen-Bradley Remote I/O, DeviceNet, ControlNet, Ethernet, ProfiBUS, Interbus, and RS485-DF1.

LCD Display
The SMC Flex controller's three-line 16-character backlit LCD display provides parameter identification using clear, informative text. Controller set up can be performed quickly and easily without the use of a reference manual. Parameters are arranged in an organized four-level menu structure for ease of programming and fast access to parameters.

Keypad Programming
Programming of parameters is accomplished through a five-button keypad on the front of the SMC Flex controller. The five buttons include up and down arrows, an Enter button, a Select button, and an Escape button. The user needs only to enter the correct sequence of keystrokes for programming the SMC Flex controller.

Auxiliary Contacts
Four fully programmable hard contacts are furnished as standard with the SMC Flex controller:

Aux #1, Aux #2, Aux #3, Aux #4

- N.O./N.C.
- Normal/Up-to-Speed/External Bypass/Fault/Alarm/Network

Network I/O
The SMC Flex can have up to two (2) inputs and four (4) outputs controlled via a communication network. The output contacts use the auxiliary contacts.

Ground Fault Input
The SMC Flex can monitor for ground fault conditions. An external core balance current transformer is required for this function. See SMC Flex User Manual for additional information.

Tach Input
A motor tachometer is required for the Linear Speed Start mode. Please see the Specifications section page 36 for tachometer characteristics.

PTC Input
A motor PTC input can be monitored by the SMC Flex. In the event of a fault, the SMC Flex will shut down and indicate a motor PTC fault.

Open and Non-Combination

150	–	F135	F	B	D	B	–	8L
a		*b*	*c*	*d*	*e*	*f*		*g*

a

Bulletin Number	
Code	Description
150	Solid-State Controller

b

Controller Ratings	
Code	Description
F5	5 A, 3 Hp @ 460V AC
F25	25 A, 15 Hp @ 460V AC
F43	43 A, 30 Hp @ 460V AC
F60	60 A, 40 Hp @ 460V AC
F85	85 A, 60 Hp @ 460V AC
F108	108 A, 75 Hp @ 460V AC
F135	135 A, 100 Hp @ 460V AC
F201	201 A, 150 Hp @ 460V AC
F251	251 A, 200 Hp @ 460V AC
F317	317 A, 250 Hp @ 460V AC
F361	361 A, 300 Hp @ 460V AC
F480	480 A, 400 Hp @ 460V AC
F625	625 A, 500 Hp @ 460V AC
F780	780 A, 600 Hp @ 460V AC
F970	970 A, 800 Hp @ 460V AC
F1250	1250 A, 1000 Hp @ 460V AC

c

Enclosure Type	
Code	Description
F	NEMA Type 4/12 (IP65) (Non-Combination Only)
N	Open

d

Input Line Voltage	
Open Type	
Code	Description
B	200…460V AC, 3-phase, 50 and 60 Hz
C	200…575V AC, 3-phase, 50 and 60 Hz
Z	230…690V AC, 3-phase, 50 and 60 Hz (Open Only)
Non-Combination Enclosed Only	
H	200…208V AC, 3-phase, 50 and 60 Hz
A	230V AC, 3-phase, 50 and 60 Hz
B	400…460V AC, 3-phase, 50 and 60 Hz
C	500…575V AC, 3-phase, 50 and 60 Hz

e

Control Voltage	
Code	Description
D	100…240V AC (5…480 A units)
R	24V AC/DC (5…480 A units) (Open Only)
E	110/120V AC (625…1250 A units)
A	230/240V AC (625…1250 A units)

f

Options (Select Only One)	
Code	Description
Blank	Standard
B	Pump Control
D	Braking Control

g

Options (Non-Combination only)	
Code	Description
8L	Line-Mounted Protective Module (enclosed only)
8M	Load-Mounted Protective Module (enclosed only)
8B	Line- and Load-Mounted Protective Modules (enclosed only)

Load-side MOVs not available with Pump and Braking options, or on Delta-connected motors. MOVs can be field installed for open type units. For a listing of available options, please see page 30.

Combination

152H	–	F480	F	BD	B	–	59	–	8B
a		*b*	*c*	*d*	*e*		*f*		*g*

a

Bulletin Number	
Code	Description
152H	Solid-State Controller with Fusible Disconnect
153H	Solid-State Controller with Circuit Breaker

b

Controller Ratings	
Code	Description
F5	5 A, 3 Hp @ 460V AC
F25	25 A, 15 Hp @ 460V AC
F43	43 A, 30 Hp @ 460V AC
F60	60 A, 40 Hp @ 460V AC
F85	85 A, 60 Hp @ 460V AC
F108	108 A, 75 Hp @ 460V AC
F135	135 A, 100 Hp @ 460V AC
F201	201 A, 150 Hp @ 460V AC
F251	251 A, 200 Hp @ 460V AC
F317	317 A, 250 Hp @ 460V AC
F361	361 A, 300 Hp @ 460V AC
F480	480 A, 400 Hp @ 460V AC
F625	625 A, 500 Hp @ 460V AC
F780	780 A, 600 Hp @ 460V AC

c

Enclosure Type	
Code	Description
F	NEMA Type 4/12 (IP65)

d

Line Voltage, 120V AC Control Voltage	
Code	Description
HD	200…208V AC, 3-phase, 50 and 60 Hz
AD	230V AC, 3-phase, 50 and 60 Hz
BD	400…460V AC, 3-phase, 50 and 60 Hz
CD	500…575V AC, 3-phase, 50 and 60 Hz

e

Control Options	
Code	Description
Blank	Standard
B	Pump Control
D	Braking Control

f

Horsepower									
Cat. No.	Hp Rating	Cat. No.	Hp Rating	Cat. No.	Hp Rating	Cat. No.	Hp Rating	Cat. No.	Hp Rating
33	0.5	39	5	46	40	52	150	60	450
34	0.75	40	7.5	47	50	54	200	61	500
35	1	41	10	48	60	56	250	62	600
36	1.5	42	15	49	75	57	300	63	700
37	2	43	20	50	100	58	350	65	800
38	3	44	25	51	125	59	400	67	1000
—	—	45	30	—	—	—	—	—	—

g

Options (see page 30 for a full listing)	
Code	Description
8L	Line-Mounted Protective Module
8M	Load-Mounted Protective Module
8B	Line- and Load-Mounted Protective Modules

Load-side MOVs not available with Pump and Braking options. For a listing of available options, please see page 30.

Product Selection

Open Type and Non-Combination Enclosed (IP65, Type 4/12) Controllers — For use with Line-Connected Motors

Enclosures other than those listed are available; consult your local Allen-Bradley distributor.

Rated Voltage [V AC]	Motor Current (A)❄	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type — Line-Connected Motors✶	IP65 (Type 4/12) Enclosed Non-Combination Controllers§➢
					Cat. No.	Cat. No.
200/208	1…5	—	1	100…240V AC, 50/60 Hz	150-F5NBD	150-F5FHD
				24V AC/DC♣	150-F5NBR	—
	5...25	—	5	100…240V AC, 50/60 Hz	150-F25NBD	150-F25FHD
				24V AC/DC♣	150-F25NBR	—
	8.6...43	—	10	100…240V AC, 50/60 Hz	150-F43NBD	150-F43FHD
				24V AC/DC♣	150-F43NBR	—
	12...60	—	15	100…240V AC, 50/60 Hz	150-F60NBD	150-F60FHD
				24V AC/DC♣	150-F60NBR	—
	17...85	—	25	100…240V AC, 50/60 Hz	150-F85NBD	150-F85FHD
				24V AC/DC♣	150-F85NBR	—
	27…108	—	30	100…240V AC, 50/60 Hz	150-F108NBD	150-F108FHD
				24V AC/DC♣	150-F108NBR	—
	34…135	—	40	100…240V AC, 50/60 Hz	150-F135NBD	150-F135FHD
				24V AC/DC♣	150-F135NBR	—
	67…201	—	60	100…240V AC, 50/60 Hz	150-F201NBD	150-F201FHD
				24V AC/DC♣	150-F201NBR	—
	84…251	—	75	100…240V AC, 50/60 Hz	150-F251NBD	150-F251FHD
				24V AC/DC♣	150-F251NBR	—
	106…317	—	100	100…240V AC, 50/60 Hz	150-F317NBD	150-F317FHD
				24V AC/DC♣	150-F317NBR	—
	120…361	—	125	100…240V AC, 50/60 Hz	150-F361NBD	150-F361FHD
				24V AC/DC♣	150-F361NBR	—
	160…480	—	150	100…240V AC, 50/60 Hz	150-F480NBD	150-F480FHD
				24V AC/DC♣	150-F480NBR	—
	208…625	—	200	110/120V AC, 50/60 Hz	150-F625NBE	150-F625FHE
				230/240V AC, 50/60 Hz	150-F625NBA	150-F625FHA
	260…780	—	250	110/120V AC, 50/60 Hz	150-F780NBE	150-F780FHE
				230/240V AC, 50/60 Hz	150-F780NBA	150-F780FHA
	323…970	—	350	110/120V AC, 50/60 Hz	150-F970NBE	—
				230/240V AC, 50/60 Hz	150-F970NBA	—
	416…1250	—	400	110/120V AC, 50/60 Hz	150-F1250NBE	—
				230/240V AC, 50/60 Hz	150-F1250NBA	—

✶ Controllers rated 108 A and greater are not equipped with line and load terminal lugs. See page 31 for terminal lug kits.

❄ Motor FLA rating should fall within specified current range for unit to operate properly.

§ These controllers require a separate 100…240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.

♣ Separate 120V or 240V single phase is required for fan operation.

➢ Line and load termination are provided as standard.

Open Type and Non-Combination Enclosed (IP65, Type 4/12) Controllers — For use with Line-Connected Motors, Continued

Enclosures other than those listed are available; consult your local Allen-Bradley distributor.

Rated Voltage [V AC]	Motor Current (A)❄	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type — Line-Connected Motors✶	IP65 (Type 4/12) Enclosed Non-Combination Controllers§➢
					Cat. No.	Cat. No.
230	1…5	1.1	1	100…240V AC, 50/60 Hz	150-F5NBD	150-F5FAD
				24V AC/DC♣	150-F5NBR	—
	5...25	5.5	7.5	100…240V AC, 50/60 Hz	150-F25NBD	150-F25FAD
				24V AC/DC♣	150-F25NBR	—
	8.6...43	11	15	100…240V AC, 50/60 Hz	150-F43NBD	150-F43FAD
				24V AC/DC♣	150-F43NBR	—
	12...60	15	20	100…240V AC, 50/60 Hz	150-F60NBD	150-F60FAD
				24V AC/DC♣	150-F60NBR	—
	17...85	22	30	100…240V AC, 50/60 Hz	150-F85NBD	150-F85FAD
				24V AC/DC♣	150-F85NBR	—
	27…108	30	40	100…240V AC, 50/60 Hz	150-F108NBD	150-F108FAD
				24V AC/DC♣	150-F108NBR	—
	34…135	37	50	100…240V AC, 50/60 Hz	150-F135NBD	150-F135FAD
				24V AC/DC♣	150-F135NBR	—
	67…201	55	75	100…240V AC, 50/60 Hz	150-F201NBD	150-F201FAD
				24V AC/DC♣	150-F201NBR	—
	84…251	75	100	100…240V AC, 50/60 Hz	150-F251NBD	150-F251FAD
				24V AC/DC♣	150-F251NBR	—
	106…317	90	125	100…240V AC, 50/60 Hz	150-F317NBD	150-F317FAD
				24V AC/DC♣	150-F317NBR	—
	120…361	110	150	100…240V AC, 50/60 Hz	150-F361NBD	150-F361FAD
				24V AC/DC♣	150-F361NBR	—
	160…480	132	200	100…240V AC, 50/60 Hz	150-F480NBD	150-F480FAD
				24V AC/DC♣	150-F480NBR	—
	208…625	200	250	110/120V AC, 50/60 Hz	150-F625NBE	150-F625FAE
				230/240V AC, 50/60 Hz	150-F625NBA	150-F625FAA
	260…780	250	300	110/120V AC, 50/60 Hz	150-F780NBE	150-F780FAE
				230/240V AC, 50/60 Hz	150-F780NBA	150-F780FAA
	323…970	315	400	110/120V AC, 50/60 Hz	150-F970NBE	—
				230/240V AC, 50/60 Hz	150-F970NBA	—
	416…1250	400	500	110/120V AC, 50/60 Hz	150-F1250NBE	—
				230/240V AC, 50/60 Hz	150-F1250NBA	—

✶ Controllers rated 108 A and greater are not equipped with line and load terminal lugs. See page 31 for terminal lug kits.

❄ Motor FLA rating should fall within specified current range for unit to operate properly.

§ These controllers require a separate 100…240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.

♣ Separate 120V or 240V single phase is required for fan operation.

➢ Line and load termination are provided as standard.

Open Type and Non-Combination Enclosed (IP65, Type 4/12) Controllers — For use with Line-Connected Motors, Continued

Enclosures other than those listed are available; consult your local Allen-Bradley distributor.

Rated Voltage [V AC]	Motor Current (A)❄	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type — Line-Connected Motors✶	IP65 (Type 4/12) Enclosed Non-Combination Controllers§➢
					Cat. No.	Cat. No.
400/415/460	1…5	2.2	3	100…240V AC, 50/60 Hz	150-F5NBD	150-F5FBD
				24V AC/DC♣	150-F5NBR	—
	5...25	11	15	100…240V AC, 50/60 Hz	150-F25NBD	150-F25FBD
				24V AC/DC♣	150-F25NBR	—
	8.6...43	22	30	100…240V AC, 50/60 Hz	150-F43NBD	150-F43FBD
				24V AC/DC♣	150-F43NBR	—
	12...60	30	40	100…240V AC, 50/60 Hz	150-F60NBD	150-F60FBD
				24V AC/DC♣	150-F60NBR	—
	17...85	45	60	100…240V AC, 50/60 Hz	150-F85NBD	150-F85FBD
				24V AC/DC♣	150-F85NBR	—
	27…108	55	75	100…240V AC, 50/60 Hz	150-F108NBD	150-F108FBD
				24V AC/DC♣	150-F108NBR	—
	34…135	75	100	100…240V AC, 50/60 Hz	150-F135NBD	150-F135FBD
				24V AC/DC♣	150-F135NBR	—
	67…201	110	150	100…240V AC, 50/60 Hz	150-F201NBD	150-F201FBD
				24V AC/DC♣	150-F201NBR	—
	84…251	132	200	100…240V AC, 50/60 Hz	150-F251NBD	150-F251FBD
				24V AC/DC♣	150-F251NBR	—
	106…317	160	250	100…240V AC, 50/60 Hz	150-F317NBD	150-F317FBD
				24V AC/DC♣	150-F317NBR	—
	120…361	200	300	100…240V AC, 50/60 Hz	150-F361NBD	150-F361FBD
				24V AC/DC♣	150-F361NBR	—
	160…480	250	400	100…240V AC, 50/60 Hz	150-F480NBD	150-F480FBD
				24V AC/DC♣	150-F480NBR	—
	208…625	355	500	110/120V AC, 50/60 Hz	150-F625NBE	150-F625FBE
				230/240V AC, 50/60 Hz	150-F625NBA	150-F625FBA
	260…780	450	600	110/120V AC, 50/60 Hz	150-F780NBE	150-F780FBE
				230/240V AC, 50/60 Hz	150-F780NBA	150-F780FBA
	323…970	560	800	110/120V AC, 50/60 Hz	150-F970NBE	—
				230/240V AC, 50/60 Hz	150-F970NBA	—
	416…1250	710	1000	110/120V AC, 50/60 Hz	150-F1250NBE	—
				230/240V AC, 50/60 Hz	150-F1250NBA	—

✶ Controllers rated 108 A and greater are not equipped with line and load terminal lugs. See page 31 for terminal lug kits.

❄ Motor FLA rating should fall within specified current range for unit to operate properly.

§ These controllers require a separate 100…240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.

♣ Separate 120V or 240V single phase is required for fan operation.

➢ Line and load termination are provided as standard.

Open Type and Non-Combination Enclosed (IP65, Type 4/12) Controllers — For use with Line-Connected Motors, Continued

Enclosures other than those listed are available; consult your local Allen-Bradley distributor.

Rated Voltage [V AC]	Motor Current (A)❄	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type — Line-Connected Motors✶	IP65 (Type 4/12) Enclosed Non-Combination Controllers§➢
					Cat. No.	Cat. No.
500/575	1...5	2.2	3	100…240V AC, 50/60 Hz	150-F5NCD	150-F5FCD
				24V AC/DC♣	150-F5NCR	—
	5...25	15	20	100…240V AC, 50/60 Hz	150-F25NCD	150-F25FCD
				24V AC/DC♣	150-F25NCR	—
	8.6...43	22	40	100…240V AC, 50/60 Hz	150-F43NCD	150-F43FCD
				24V AC/DC♣	150-F43NCR	—
	12...60	37	50	100…240V AC, 50/60 Hz	150-F60NCD	150-F60FCD
				24V AC/DC♣	150-F60NCR	—
	17...85	55	75	100…240V AC, 50/60 Hz	150-F85NCD	150-F85FCD
				24V AC/DC♣	150-F85NCR	—
	27…108	75	100	100…240V AC, 50/60 Hz	150-F108NCD	150-F108FCD
				24V AC/DC♣	150-F108NCR	—
	34…135	90	125	100…240V AC, 50/60 Hz	150-F135NCD	150-F135FCD
				24V AC/DC♣	150-F135NCR	—
	67…201	132	300	100…240V AC, 50/60 Hz	150-F201NCD	150-F201FCD
				24V AC/DC♣	150-F201NCR	—
	84…251	160	250	100…240V AC, 50/60 Hz	150-F251NCD	150-F251FCD
				24V AC/DC♣	150-F251NCR	—
	106…317	200	300	100…240V AC, 50/60 Hz	150-F317NCD	150-F317FCD
				24V AC/DC♣	150-F317NCR	—
	120…361	250	350	100…240V AC, 50/60 Hz	150-F361NCD	150-F361FCD
				24V AC/DC♣	150-F361NCR	—
	160…480	315	500	100…240V AC, 50/60 Hz	150-F480NCD	150-F480FCD
				24V AC/DC♣	150-F480NCR	—
	208…625	450	600	110/120V AC, 50/60 Hz	150-F625NCE	150-F625FCE
				230/240V AC, 50/60 Hz	150-F625NCA	150-F625FCA
	260…780	560	800	110/120V AC, 50/60 Hz	150-F780NCE	150-F780FCE
				230/240V AC, 50/60 Hz	150-F780NCA	150-F780FCA
	323…970	710	1000	110/120V AC, 50/60 Hz	150-F970NCE	—
				230/240V AC, 50/60 Hz	150-F970NCA	—
	416…1250	900	1300	110/120V AC, 50/60 Hz	150-F1250NCE	—
				230/240V AC, 50/60 Hz	150-F1250NCA	—

Rated Voltage [V AC]	Motor Current (A)❄	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type — Line-Connected Motors✶
					Cat. No.
690/Y	27…108	90	100	100…240V AC, 50/60 Hz	150-F108NZD
	34…135	132	175	100…240V AC, 50/60 Hz	150-F135NZD
	67…201	160	200	100…240V AC, 50/60 Hz	150-F201NZD
	84…251	200	250	100…240V AC, 50/60 Hz	150-F251NZD
	106…317	315	400	100…240V AC, 50/60 Hz	150-F317NZD
	120…361	355	450	100…240V AC, 50/60 Hz	150-F361NZD
	160…480	450	600	100…240V AC, 50/60 Hz	150-F480NZD
	208…625	630	800	110/120V AC, 50/60 Hz	150-F625NZE
				230/240V AC, 50/60 Hz	150-F625NZA
	260…780	800	1000	110/120V AC, 50/60 Hz	150-F780NZE
				230/240V AC, 50/60 Hz	150-F780NZA
	323…970	1000	1300	110/120V AC, 50/60 Hz	150-F970NZE
				230/240V AC, 50/60 Hz	150-F970NZA
	416…1250	1200	1600	110/120V AC, 50/60 Hz	150-F1250NZE
				230/240V AC, 50/60 Hz	150-F1250NZA

✶ Controllers rated 108 A and greater are not equipped with line and load terminal lugs. See page 31 for terminal lug kits.

❄ Motor FLA rating should fall within specified current range for unit to operate properly.

§ These controllers require a separate 100…240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.

♣ Separate 120V or 240V single phase is required for fan operation.

➢ Line and load termination are provided as standard.

Open Type Controllers — For use with Delta-Connected Motors

Rated Voltage [V AC]	Motor Current (A)❄	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type✶ Cat. No.
200/208	1.7…8.7	—	2	100…240V AC, 50/60 Hz	150-F5NBD
				24V AC/DC♣	150-F5NBR
	8.7…43	—	10	100…240V AC, 50/60 Hz	150-F25NBD
				24V AC/DC♣	150-F25NBR
	14.9…74	—	20	100…240V AC, 50/60 Hz	150-F43NBD
				24V AC/DC♣	150-F43NBR
	20.8…104	—	30	100…240V AC, 50/60 Hz	150-F60NBD
				24V AC/DC♣	150-F60NBR
	29.4…147	—	40	100…240V AC, 50/60 Hz	150-F85NBD
				24V AC/DC♣	150-F85NBR
	47…187	—	60	100…240V AC, 50/60 Hz	150-F108NBD
				24V AC/DC♣	150-F108NBR
	59…234	—	75	100…240V AC, 50/60 Hz	150-F135NBD
				24V AC/DC♣	150-F135NBR
	116…348	—	100	100…240V AC, 50/60 Hz	150-F201NBD
				24V AC/DC♣	150-F201NBR
	145…435	—	150	100…240V AC, 50/60 Hz	150-F251NBD
				24V AC/DC♣	150-F251NBR
	183…549	—	200	100…240V AC, 50/60 Hz	150-F317NBD
				24V AC/DC♣	150-F317NBR
	208…625	—	200	100…240V AC, 50/60 Hz	150-F361NBD
				24V AC/DC♣	150-F361NBR
	277…831	—	300	100…240V AC, 50/60 Hz	150-F480NBD
				24V AC/DC♣	150-F480NBR
	283…850	—	300	110/120V AC, 50/60 Hz	150-F625NBE
				230/240V AC, 50/60 Hz	150-F625NBA
	300…900	—	300	110/120V AC, 50/60 Hz	150-F780NBE
				230/240V AC, 50/60 Hz	150-F780NBA
	400…1200	—	400	110/120V AC, 50/60 Hz	150-F970NBE
				230/240V AC, 50/60 Hz	150-F970NBA
	533…1600	—	500	110/120V AC, 50/60 Hz	150-F1250NBE
				230/240V AC, 50/60 Hz	150-F1250NBA

✶ Controllers rated 108 A and greater are not equipped with line and load terminal lugs. See page 31 for terminal lug kits.
❄ Motor FLA rating should fall within specified current range for unit to operate properly.
§ These controllers require a separate 100…240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.
♣ Separate 120V or 240V single phase is required for fan operation.
➢ Line and load termination are provided as standard.

Open Type Controllers — For use with Delta-Connected Motors, Continued

Rated Voltage [V AC]	Motor Current (A)❄	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type∗ Cat. No.
230	1.7…8.7	2.2	2	100…240V AC, 50/60 Hz	150-F5NBD
				24V AC/DC♣	150-F5NBR
	8.7…43	11	15	100…240V AC, 50/60 Hz	150-F25NBD
				24V AC/DC♣	150-F25NBR
	14.9…74	22	25	100…240V AC, 50/60 Hz	150-F43NBD
				24V AC/DC♣	150-F43NBR
	20.8…104	30	40	100…240V AC, 50/60 Hz	150-F60NBD
				24V AC/DC♣	150-F60NBR
	29.4…147	45	50	100…240V AC, 50/60 Hz	150-F85NBD
				24V AC/DC♣	150-F85NBR
	47…187	55	60	100…240V AC, 50/60 Hz	150-F108NBD
				24V AC/DC♣	150-F108NBR
	59…234	75	75	100…240V AC, 50/60 Hz	150-F135NBD
				24V AC/DC♣	150-F135NBR
	116…348	110	125	100…240V AC, 50/60 Hz	150-F201NBD
				24V AC/DC♣	150-F201NBR
	145…435	132	150	100…240V AC, 50/60 Hz	150-F251NBD
				24V AC/DC♣	150-F251NBR
	183…549	160	200	100…240V AC, 50/60 Hz	150-F317NBD
				24V AC/DC♣	150-F317NBR
	208…625	200	250	100…240V AC, 50/60 Hz	150-F361NBD
				24V AC/DC♣	150-F361NBR
	277…831	250	350	100…240V AC, 50/60 Hz	150-F480NBD
				24V AC/DC♣	150-F480NBR
	283…850	250	350	110/120V AC, 50/60 Hz	150-F625NBE
				230/240V AC, 50/60 Hz	150-F625NBA
	300…900	250	350	110/120V AC, 50/60 Hz	150-F780NBE
				230/240V AC, 50/60 Hz	150-F780NBA
	400…1200	400	400	110/120V AC, 50/60 Hz	150-F970NBE
				230/240V AC, 50/60 Hz	150-F970NBA
	533…1600	500	600	110/120V AC, 50/60 Hz	150-F1250NBE
				230/240V AC, 50/60 Hz	150-F1250NBA

∗ Controllers rated 108 A and greater are not equipped with line and load terminal lugs. See page 31 for terminal lug kits.
❄ Motor FLA rating should fall within specified current range for unit to operate properly.
§ These controllers require a separate 100…240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.
♣ Separate 120V or 240V single phase is required for fan operation.
➢ Line and load termination are provided as standard.

Open Type Controllers — For use with Delta-Connected Motors, Continued

Rated Voltage [V AC]	Motor Current (A)❄	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type∗ Cat. No.
400/415/460	1.7…8.7	4	5	100…240V AC, 50/60 Hz	150-F5NBD
				24V AC/DC♣	150-F5NBR
	8.7…43	22	30	100…240V AC, 50/60 Hz	150-F25NBD
				24V AC/DC♣	150-F25NBR
	14.9…74	37	50	100…240V AC, 50/60 Hz	150-F43NBD
				24V AC/DC♣	150-F43NBR
	20.8…104	55	75	100…240V AC, 50/60 Hz	150-F60NBD
				24V AC/DC♣	150-F60NBR
	29.4…147	75	100	100…240V AC, 50/60 Hz	150-F85NBD
				24V AC/DC♣	150-F85NBR
	47…187	90	150	100…240V AC, 50/60 Hz	150-F108NBD
				24V AC/DC♣	150-F108NBR
	59…234	132	150	100…240V AC, 50/60 Hz	150-F135NBD
				24V AC/DC♣	150-F135NBR
	116…348	160	250	100…240V AC, 50/60 Hz	150-F201NBD
				24V AC/DC♣	150-F201NBR
	145…435	250	350	100…240V AC, 50/60 Hz	150-F251NBD
				24V AC/DC♣	150-F251NBR
	183…549	315	450	100…240V AC, 50/60 Hz	150-F317NBD
				24V AC/DC♣	150-F317NBR
	208…625	355	500	100…240V AC, 50/60 Hz	150-F361NBD
				24V AC/DC♣	150-F361NBR
	277…831	450	700	100…240V AC, 50/60 Hz	150-F480NBD
				24V AC/DC♣	150-F480NBR
	283…850	500	700	110/120V AC, 50/60 Hz	150-F625NBE
				230/240V AC, 50/60 Hz	150-F625NBA
	300…900	500	700	110/120V AC, 50/60 Hz	150-F780NBE
				230/240V AC, 50/60 Hz	150-F780NBA
	400…1200	710	1000	110/120V AC, 50/60 Hz	150-F970NBE
				230/240V AC, 50/60 Hz	150-F970NBA
	533…1600	900	1400	110/120V AC, 50/60 Hz	150-F1250NBE
				230/240V AC, 50/60 Hz	150-F1250NBA

∗ Controllers rated 108 A and greater are not equipped with line and load terminal lugs. See page 31 for terminal lug kits.
❄ Motor FLA rating should fall within specified current range for unit to operate properly.
§ These controllers require a separate 100…240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.
♣ Separate 120V or 240V single phase is required for fan operation.
➢ Line and load termination are provided as standard.

Open Type Controllers — For use with Delta-Connected Motors, Continued

Rated Voltage [V AC]	Motor Current (A)❄	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type∗ Cat. No.
500/575	1.7…8.7	5.5	7.5	100…240V AC, 50/60 Hz	150-F5NCD
				24V AC/DC♣	150-F5NCR
	8.7…43	15	40	100…240V AC, 50/60 Hz	150-F25NCD
				24V AC/DC♣	150-F25NCR
	14.9…74	45	60	100…240V AC, 50/60 Hz	150-F43NCD
				24V AC/DC♣	150-F43NCR
	20.8…104	55	100	100…240V AC, 50/60 Hz	150-F60NCD
				24V AC/DC♣	150-F60NCR
	29.4…147	90	150	100…240V AC, 50/60 Hz	150-F85NCD
				24V AC/DC♣	150-F85NCR
	47…187	132	150	100…240V AC, 50/60 Hz	150-F108NCD
				24V AC/DC♣	150-F108NCR
	59…234	160	200	100…240V AC, 50/60 Hz	150-F135NCD
				24V AC/DC♣	150-F135NCR
	116…348	250	300	100…240V AC, 50/60 Hz	150-F201NCD
				24V AC/DC♣	150-F201NCR
	145…435	315	400	100…240V AC, 50/60 Hz	150-F251NCD
				24V AC/DC♣	150-F251NCR
	183…549	400	500	100…240V AC, 50/60 Hz	150-F317NCD
				24V AC/DC♣	150-F317NCR
	208…625	450	600	100…240V AC, 50/60 Hz	150-F361NCD
				24V AC/DC♣	150-F361NCR
	277…831	560	900	100…240V AC, 50/60 Hz	150-F480NCD
				24V AC/DC♣	150-F480NCR
	283…850	560	900	110/120V AC, 50/60 Hz	150-F625NCE
				230/240V AC, 50/60 Hz	150-F625NCA
	300…900	630	900	110/120V AC, 50/60 Hz	150-F780NCE
				230/240V AC, 50/60 Hz	150-F780NCA
	400…1200	800	1300	110/120V AC, 50/60 Hz	150-F970NCE
				230/240V AC, 50/60 Hz	150-F970NCA
	533…1600	1100	1600	110/120V AC, 50/60 Hz	150-F1250NCE
				230/240V AC, 50/60 Hz	150-F1250NCA

∗ Controllers rated 108 A and greater are not equipped with line and load terminal lugs. See page 31 for terminal lug kits.
❄ Motor FLA rating should fall within specified current range for unit to operate properly.
§ These controllers require a separate 100…240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.
♣ Separate 120V or 240V single phase is required for fan operation.
➢ Line and load termination are provided as standard.

Combination Line-Connected Controllers — IP65 (Type 4/12) Enclosed with Fusible Disconnect or Circuit Breaker

These controllers include line and load terminations. Enclosures other than those listed are available; consult your local Allen-Bradley distributor. All 153 bulletin numbers are supplied with thermal magnetic circuit breakers.

The Fusible Disconnects do not come with fuses.

Rated Voltage [V AC]	kW, 50 Hz	Hp, 60 Hz	Controller Current Rating ❄	IP65 (Type 4/12) Enclosed Combination Controllers with Fusible Disconnect✶	IP65 (Type 4/12) Enclosed Combination Controllers with Circuit Breaker✶
				Cat. No.	Cat. No.
200	—	0.5	5 A	152H-F5FHD-33	153H-F5FHD-33
	—	0.75	5 A	152H-F5FHD-34	153H-F5FHD-34
	—	1	5 A	152H-F5FHD-35	153H-F5FHD-35
	—	1.5	25 A	152H-F25FHD-36	153H-F25FHD-36
	—	2	25 A	152H-F25FHD-37	153H-F25FHD-37
	—	3	25 A	152H-F25FHD-38	153H-F25FHD-38
	—	5	25 A	152H-F25FHD-39	153H-F25FHD-39
	—	5	25 A	152H-F25FHD-40	153H-F25FHD-40
	—	10	43 A	152H-F43FHD-41	153H-F43FHD-41
	—	15	60 A	152H-F60FHD-42	153H-F60FHD-42
	—	20	85 A	152H-F85FHD-43	153H-F85FHD-43
	—	25	85 A	152H-F85FHD-44	153H-F85FHD-44
	—	30	108 A	152H-F108FHD-45	153H-F108FHD-45
	—	40	135 A	152H-F135FHD-46	153H-F135FHD-46
	—	50	201 A	152H-F201FHD-47	153H-F201FHD-47
	—	60	201 A	152H-F201FHD-48	153H-F201FHD-48
	—	75	251 A	152H-F251FHD-49	153H-F251FHD-49
	—	100	317 A	152H-F317FHD-50	153H-F317FHD-50
	—	125	361 A	152H-F361FHD-51	153H-F361FHD-51
	—	150	480 A	152H-F480FHD-52	153H-F480FHD-52
	—	200	625 A	152H-F625FHD-54	153H-F625FHD-54
	—	250	780 A	152H-F780FHD-56	153H-F780FHD-56
230	0.37	0.5	5 A	152H-F5FAD-33	153H-F5FAD-33
	0.55	0.75	5 A	152H-F5FAD-34	153H-F5FAD-34
	0.75	1	5 A	152H-F5FAD-35	153H-F5FAD-35
	1.1	1.5	25 A	152H-F25FAD-36	153H-F25FAD-36
	1.5	2	25 A	152H-F25FAD-37	153H-F25FAD-37
	2.2	3	25 A	152H-F25FAD-38	153H-F25FAD-38
	3.7	5	25 A	152H-F25FAD-39	153H-F25FAD-39
	5.5	7.5	25 A	152H-F25FAD-40	153H-F25FAD-40
	7.5	10	43 A	152H-F43FAD-41	153H-F43FAD-41
	11	15	43 A	152H-F43FAD-42	153H-F43FAD-42
	15	20	60 A	152H-F60FAD-43	153H-F60FAD-43
	18.5	25	85 A	152H-F85FAD-44	153H-F85FAD-44
	22	30	85 A	152H-F85FAD-45	153H-F85FAD-45
	30	40	108 A	152H-F108FAD-46	153H-F108FAD-46
	37	50	135 A	152H-F135FAD-47	153H-F135FAD-47
	45	60	201 A	152H-F201FAD-48	153H-F201FAD-48
	55	75	201 A	152H-F201FAD-49	153H-F201FAD-49
	75	100	251 A	152H-F251FAD-50	153H-F251FAD-50
	90	125	317 A	152H-F317FAD-51	153H-F317FAD-51
	110	150	361 A	152H-F361FAD-52	153H-F361FAD-52
	132	200	480 A	152H-F480FAD-54	153H-F480FAD-54
	185	250	625 A	152H-F625FAD-56	153H-F625FAD-56
	220	300	780 A	152H-F780FAD-57	153H-F780FAD-57

✶ These controllers require a separate 100…240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.

❄ The nominal current rating for the combination package may differ from the controller, based on the horsepower. Consult your local Allen-Bradley distributor.

Combination Line-Connected Controllers — IP65 (Type 4/12) Enclosed with Fusible Disconnect or Circuit Breaker, Cont.

These controllers include line and load terminations. Enclosures other than those listed are available; consult your local Allen-Bradley distributor. All 153 bulletin numbers are supplied with thermal magnetic circuit breakers.

The Fusible Disconnects do not come with fuses.

Rated Voltage [V AC]	kW, 50 Hz	Hp, 60 Hz	Controller Current Rating ❄	IP65 (Type 4/12) Enclosed Combination Controllers with Fusible Disconnect✶	IP65 (Type 4/12) Enclosed Combination Controllers with Circuit Breaker✶
				Cat. No.	Cat. No.
400/460	0.37	0.5	5 A	152H-F5FBD-33	153H-F5FBD-33
	0.55	0.75	5 A	152H-F5FBD-34	153H-F5FBD-34
	0.75	1	5 A	152H-F5FBD-35	153H-F5FBD-35
	1.1	1.5	5 A	152H-F5FBD-36	153H-F5FBD-36
	1.5	2	5 A	152H-F5FBD-37	153H-F5FBD-37
	2.2	3	5 A	152H-F5FBD-38	153H-F5FBD-38
	3.7	5	25 A	152H-F25FBD-39	153H-F25FBD-39
	5.5	7.5	25 A	152H-F25FBD-40	153H-F25FBD-40
	7.5	10	25 A	152H-F25FBD-41	153H-F25FBD-41
	11	15	25 A	152H-F25FBD-42	153H-F25FBD-42
	15	20	43 A	152H-F43FBD-43	153H-F25FBD-43
	18.5	25	43 A	152H-F43FBD-44	153H-F43FBD-44
	22	30	43 A	152H-F43FBD-45	153H-F43FBD-45
	30	40	60 A	152H-F60FBD-46	153H-F60FBD-46
	37	50	85 A	152H-F85FBD-47	153H-F85FBD-47
	45	60	85 A	152H-F85FBD-48	153H-F85FBD-48
	55	75	108 A	152H-F108FBD-49	153H-F108FBD-49
	75	100	135 A	152H-F135FBD-50	153H-F135FBD-50
	90	125	201 A	152H-F201FBD-51	153H-F201FBD-51
	110	150	201 A	152H-F201FBD-52	153H-F201FBD-52
	132	200	251 A	152H-F251FBD-54	153H-F251FBD-54
	160	250	317 A	152H-F317FBD-56	153H-F317FBD-56
	200	300	361 A	152H-F361FBD-57	153H-F361FBD-57
	250	350	480 A	152H-F480FBD-58	153H-F480FBD-58
	250	400	480 A	152H-F480FBD-59	153H-F480FBD-59
	355	500	625 A	152H-F625FBD-61	153H-F625FBD-61
	450	600	780 A	152H-F780FBD-62	153H-F780FBD-62
500/575	0.37	0.75	5 A	152H-F5FCD-34	153H-F5FCD-34
	0.55	1	5 A	152H-F5FCD-35	153H-F5FCD-35
	0.75	1.5	5 A	152H-F5FCD-36	153H-F5FCD-36
	1.1	2	5 A	152H-F5FCD-37	153H-F5FCD-37
	2.2	3	5 A	152H-F5FCD-38	153H-F5FCD-38
	3.7	5	25 A	152H-F25FCD-39	153H-F25FCD-39
	5.5	7.5	25 A	152H-F25FCD-40	153H-F25FCD-40
	7.5	10	25 A	152H-F25FCD-41	153H-F25FCD-41
	11	15	25 A	152H-F25FCD-42	153H-F25FCD-42
	15	20	43 A	152H-F43FCD-43	153H-F43FCD-43
	18.5	25	43 A	152H-F43FCD-44	153H-F43FCD-44
	22	30	43 A	152H-F43FCD-45	153H-F43FCD-45
	22	40	43 A	152H-F43FCD-46	153H-F43FCD-46
	37	50	60 A	152H-F60FCD-47	153H-F60FCD-47
	45	60	85 A	152H-F85FCD-48	153H-F85FCD-48
	55	75	85 A	152H-F85FCD-49	153H-F85FCD-49
	75	100	108 A	152H-F108FCD-50	153H-F108FCD-50
	90	125	135 A	152H-F135FCD-51	153H-F135FCD-51
	110	150	201 A	152H-F201FCD-52	153H-F201FCD-52
	132	200	201 A	152H-F201FCD-54	153H-F201FCD-54
	160	250	251 A	152H-F251FCD-56	153H-F251FCD-56
	200	300	317 A	152H-F317FCD-57	153H-F317FCD-57
	250	350	361 A	152H-F361FCD-58	153H-F361FCD-58
	295	400	480 A	152H-F480FCD-59	153H-F480FCD-59
	315	450	480 A	152H-F480FCD-60	153H-F480FCD-60
	315	500	480 A	152H-F480FCD-61	153H-F480FCD-61
	450	600	625 A	152H-F625FCD-62	153H-F625FCD-62
	560	800	780 A	152H-F780FCD-65	153H-F780FCD-65

✶ These controllers require a separate 100…240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.

❄ The nominal current rating for the combination package may differ from the controller, based on the horsepower. Consult your local Allen-Bradley distributor.

Control Options (open and enclosed)

Option	Description	Cat. No. Modification
Pump Control	Provides smooth motor acceleration and deceleration, reducing surges caused by the starting and stopping of centrifugal pumps. Starting time is adjustable from 0…30 seconds, and stopping time is adjustable from 0…120 seconds.	B✶
Braking Control	Provides Smart Motor Braking (SMB), Accu-Stop, and Slow Speed with Braking.	D✶

Enclosed Options

Option	Description	Cat. No. Modification
Push Buttons	Start-Stop Push Button	-1
	Start-Stop Push Button with H-O-A Selector Switch	-1F
	Soft Stop Push Button❄	1XA
	Pump Stop Push Button❄	1XB
	Slow Speed Push Button❄	1XC
	Brake Push Button❄	1XD
	Accu-Stop/Slow Speed Push Button❄	1XE
	Emergency Stop	-1E
	Fault Reset	-FR
Selector Switch	Hand-Off-Auto Selector Switch	-3
	SMC-Off-Bypass Selector Switch	-3B ✦
Pilot Lights	Transformer Pilot Light - Green Power On Indicator	-4G
	Transformer Pilot Light - Red Run Indicator	-4R
	Push-to-Test Pilot Light - Red Run Indicator	-5R
Control Circuit Transformer	Control Circuit Transformer (fused primary and secondary)	-6P
	Additional 100 VA Control Circuit Transformer (fused primary and secondary)	-6PX
	1000 VA Control Circuit Transformer (fused primary and secondary)	-6PK
	1600 VA Control Circuit Transformer (fused primary and secondary)	-6PL
	2000 VA Control Circuit Transformer (fused primary and secondary)	-6PM
Protective Modules	480V Line Side Protective Module	-8L
	600V Line Side Protective Module	
	480V Load Side Protective Module	-8M
	600V Load Side Protective Module	
	480V Both Line and Load Side Protective Modules	-8B
	600V Both Line and Load Side Protective Modules	
Human Interface Module	Door-mounted, Full Numeric (Type 4/12)	-HC3
Communication Module	Remote I/O	-20R
	RS-485	-20S
	DeviceNet	-20D
	Ethernet/IP	-20E
	Control Net	-20C
Disconnect Auxiliary	N.O. disconnect auxiliary mounted on operating mechanism	-98
	N.C. disconnect auxiliary mounted on operating mechanism	-99
Circuit Breaker Auxiliary	Internal N.O. circuit breaker auxiliary	-98X
	Internal N.C. circuit breaker auxiliary	-99X
Service Entrance Label	Service Entrance Label	-SEL
U.L. Label	U.L. Label	-UL
Oil Pump Starter	NEMA Size 1 509 and Solid-State Overload	-OPS

✶ Add the designated letter to the end of the cat. no. Example: To add the Pump Control option: **Cat. No. 150-F361NBDB** or **Cat. No. 152H-F361FBDB-57**.
❄ Option push buttons are available only when the corresponding option module is selected. Example: **Cat. No. 150-F108FBDB-1XB**.
✦ Bypass contactor and overload are not included with this option. A **-NB** or **-BP** needs to be added to the catalog string to add these devices.

Enclosed Options, Continued

Option	Description	Cat. No. Modification
NEMA Bypass Contactor	5…43 A	-NB
	60…85 A	
	108…135 A	
	201…251 A	
	317…361 A	
	480 A	
NEMA Isolation Contactor	5…43 A	-NI
	60…85 A	
	108…135 A	
	201…251 A	
	317…361 A	
	480 A	
MCS Isolation Contactor	5…43 A	15xB-F-
	60…85 A	
	108…135 A	
	201…251 A	
	317…361 A	
	480 A	
MCS Bypass Contactor	5…43 A	-BP
	60…85 A	
	108…135 A	
	201…251 A	
	317…361 A	
	480 A	

Accessories

Protective Modules∗

Current Rating	Description	Field Modification Cat. No.
5…85	480V Protective Module	150-F84
108…1250		150-F84L
5…85	600V Protective Module	150-F86
108…1250		150-F86L

∗ The same protective module mounts on the line or load side of the SMC-Flex. For applications requiring both line and load side protection, two protective modules must be ordered.

Terminal Lug Kits (108…1250 A)

Current Rating (A) ❄	Wire Size	Total No. of Line Controller Terminal Lugs Possible Each Side		Pkg. Qty.	Cat. No.
		Line Side	Load Side		
108…135♣	#6…250 MCM AWG 16 mm²…120 mm²	3	3	3	199-LF1
201…251♣		6	6		
317…480♣	#4…500 MCM AWG 25 mm²…240 mm²	6	6		199-LG1
625…780	2/0…500 MCM AWG	6	6		100-DL630
970	4/0…500 MCM AWG	3	3		100-DL860
1250§	2/0…500 MCM AWG	3	3		100-DL630
	4/0…500 MCM AWG	3	3		100-DL860

Line and Load terminals are provided as standard on enclosed SMCs.
❄ 5…85 A units have box lugs standard. No additional lugs are required.
§ The 1250 A device requires (1) 100-DL630 and (1) 100-DL860 per connection.
♣ When a multi-conductor lug is required, refer to the User Manual for appropriate lug catalog number.

IEC Terminal Covers

Description‡	Package Quantity	Field Modification Cat. No.
Terminal Covers IEC line or load terminal covers for 108…135 A devices. Dead front protection	1	150-TC1
Terminal Covers IEC line or load terminal covers for 201…251 A devices. Dead front protection	1	150-TC2
Terminal Covers IEC line or load terminal covers for 317…480 A devices. Dead front protection	1	150-TC3

‡ 5…85 A units have terminal guards standard. No additional terminal guards are required.

Human Interface and Communication Modules

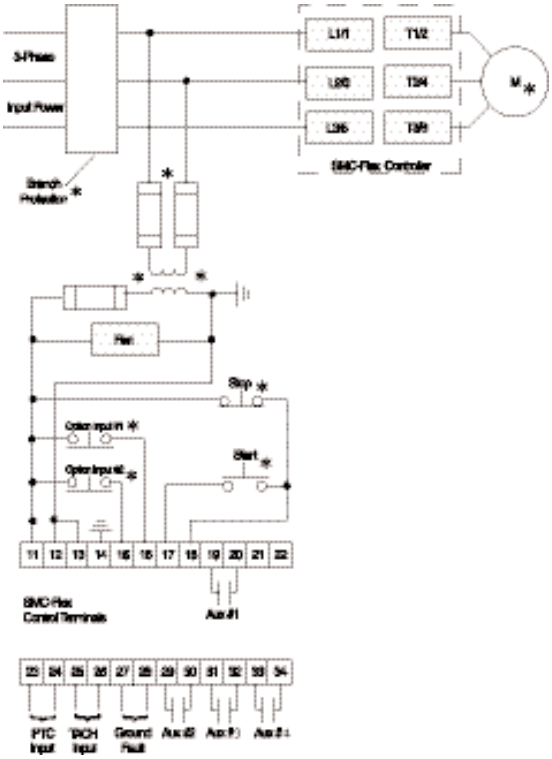
Description			For Use With	Cat. No.
	Hand Held Human Interface Modules	LCD Display, Digital Speed HIM∗		20-HIM-A2
		LCD Display, Full Numeric Keypad∗		20-HIM-A3
		LCD Display, Analog Speed Potentiometer HIM∗		20-HIM-A4
		LCD Display, Programmer Only HIM∗		20-HIM-A5
	Door Mounted Human Interface Modules	LCD Display, Full Numeric Keypad (includes cable)		20-HIM-C3
		LCD Display, Full Numeric Keypad (includes 3 m cable)		20-HIM-C3S
		LCD Display, Programmer Only HIM (includes cable)		20-HIM-C5
		LCD Display, Programmer Only HIM (includes 3 m cable)		20-HIM-C5S
	Human Interface Module Interface Cables	HIM Interface Cable, 1 m (39 in.)		20-HIM-H10
		Cable Kit, 0.33 meters (1.1 feet)		1202-H03
		Cable Kit, 1 meter (3.3 feet)		1202-H10
		Cable Kit, 3 meters (9.8 feet)		1202-H30
		Cable Kit, 9 meters (29.5 feet)		1202-H90
		DPI/SCANport™ One to Two Port Splitter Cable		1203-S03
Description (IP30/Type 1)			**For Use With**	
	Communication Modules	Remote I/O	Bulletin 150 SMC-Flex	20-COMM-R
		RS-485/DF1		20-COMM-S
		ProfiBUS		20-COMM-P
		ControlNet		20-COMM-C
		Interbus		20-COMM-I
		DeviceNet™		20-COMM-D
		Ethernet/IP		20-COMM-E
		RS485 HVAC		20-COMM-H
		ControlNet (Fiber)		20-COMM-Q
	DriveTools™	Programming Software	WIN NT/2000/XP	9303-4DTE01ENE
	DriveTools™ Sp	Programming Software	WIN NT/2000/XP	9303-4DTS01ENE
	Anacanda RS232 to DPi	PC Interface	Serial	1203-SSS
	DPi to USB	PC Interface	USB	1203-USB

∗ Requires a 20-HIM-H10 cable to connect to the SMC-Flex.

Specifications

Functional Design Specifications			
Standard Features	Installation	Power Wiring	Standard squirrel-cage induction motor or a Wye-Delta, six-lead motor.
		Control Wiring	2- and 3-wire control for a wide variety of applications.
	Setup	Keypad	Front keypad and backlit LCD display.
		Software	Parameter values can be downloaded to the SMC-Flex Controller with DriveTools programming software and the Cat. No. 20-COMM… DPI communication module.
	Communications		One DPI provided for connection to optional human interface and communication modules.
	Starting and Stopping Modes		Soft Start Current Limit Start Dual Ramp Full Voltage Linear Speed Acceleration Preset Slow Speed Soft Stop
	Protection and Diagnostics		Power loss, line fault, voltage unbalance, excessive starts/hour, phase reversal, undervoltage, overvoltage, controller temp, stall, jam, open gate, overload, underload, communication fault.
	Metering		Amps, volts, kW, kWH, mW, mWH, elapsed time, power factor, motor thermal capacity usage.
	Alarm Contact		Overload, underload, undervoltage, overvoltage, unbalance, jam, stall, and ground fault
	Status Indication		Stopped, starting, stopping, at speed, alarm, and fault.
	Auxiliary Contacts		Four fully programmable contacts as normal/up-to-speed/fault/alarm/network (N.O./N.C.), or external bypass (N.O. only).
Optional Features	Pump Control		Helps reduce fluid surges in centrifugal pumping systems during starting and stopping period. Starting time is adjustable from 0…30 seconds. Stopping time is adjustable from 0…120 seconds.
	Braking Control	SMB Smart Motor Braking	Provides motor braking without additional equipment for applications that require the motor to stop quickly. Braking current is adjustable from 0…400% of the motor's full-load current rating.
		Accu-Stop	Provides controlled position stopping. During stopping, braking torque is applied to the motor until it reaches preset slow speed (7% or 15% of rated speed) and holds the motor at this speed until a stop command is given. Braking torque is then applied until the motor reaches zero speed. Braking current is programmable from 0…450% of full-load current.
		Slow Speed with Braking	Used on applications that require slow speed (in the forward direction) for positioning or alignment and also require braking control to stop.

Wiring Diagram — Line Controller



* Customer supplied.

Electrical Ratings				
		Device Rating	UL/CSA/NEMA	IEC
Power Circuit	Rated Operation Voltage	480V	200…480V AC (–15%, +10%)	200…415V
		600V	200…600V AC (–15%, +10%)	200…500V
		690V	230…600V AC (–15%, +10%)	230…690V/Y
	Rated Insulation Voltage	480V	N/A	500V
		600V		500V
		690V		690V
	Rated Impulse Voltage	480V	N/A	6000V
		600V		
		690V		
	Dielectric Withstand	480V	2200V AC	2500V
		600V		
		690V		
	Repetitive Peak Inverse Voltage Rating	480V	1400V	1400V
		600V	1600V	1600V
		690V	1800V	1800V
	Operating Frequency	All	50/60 Hz	
	Utilization Category	5…480 A	MG 1	AC-53B:3.0-50:1750
		625…1250 A	MG 1	AC-53B:3.0-50:3550
	Protection Against Electrical Shock	5…85 A	N/A	IP20
		108…480 A		IP2X (with terminal covers)
		625…1250 A		IP00 (open device)
	DV/DT Protection	480V & 600V	RC Snubber Network	
		690V	None	
	Transient Protection	480V & 600V	Metal Oxide Varistors: 220 Joules	
		690V	None	
Control Circuit	Rated Operational Voltage§	5…480 A	100…240V AC or 24V AC/DC	
		625…1250 A	110/120V AC and 230/240V AC	
	Rated Insulation Voltage	All	N/A	240V
	Rated Impulse Voltage	All	N/A	3000V
	Dielectric Withstand	All	1600V AC	2000V
	Operating Frequency	All	50/60 Hz	
	Input onstate voltage minimum		85V AC, 19.2V DC / 20.4V AC	
	Input onstate current		20 mA @120V AC / 40 mA @ 240V AC, 7.6 mA @ 24V AC/DC	
	Input offstate voltage maximum		50V AC, 10V DC / 12V AC	
	Input offstate current @ input offstate voltage		<10 mA AC, <3 mA DC	

§ 690V power is only available with 100…240V control.

Electrical Ratings								
Short Circuit Protection	SCPD Performance 200…600V		Type 1					
	SCCR List✶		Max. Standard Available Fault	Max. Standard Fuse (A)❄	Max. Standard Available Fault	Max. Circuit Breaker (A)	Max. High Fault	Max. Fuse (A) ‡
	Line Device Operational Current Rating (A)	5	10 kA	20	10 kA	20	70 kA	10
		25	10 kA	100	10 kA	100	70 kA	50
		43	10 kA	150	10 kA	150	70 kA	90
		60	10 kA	225	10 kA	225	70 kA	125
		85	10 kA	300	10 kA	300	70 kA	175
		108	18 kA	400	18 kA	300	70 kA	200
		135	18 kA	500	18 kA	400	70 kA	225
		201	30 kA	600	30 kA	600	70 kA	350
		251	30 kA	700	30 kA	700	70 kA	400
		317	42 kA	800	30 kA	800	69 kA	500
		361	42 kA	1000	30 kA	1000	69 kA	600
		480	42 kA	1200	30 kA	1200	69 kA	800
		625	42 kA	1600	42 kA	1600	74 kA	1600
		780	42 kA	1600	42 kA	2000	74 kA	1600
		970	85 kA	2500	85 kA	2500	85 kA	2500
		1250	85 kA	3000	85 kA	3200	85 kA	3000
	Delta Device Operational Current Rating (A)	8.7	10 kA	35	10 kA	35	70 kA	17.5
		43	10 kA	150	10 kA	150	70 kA	90
		74	10 kA	300	10 kA	300	70 kA	150
		104	10 kA	400	10 kA	300	70 kA	200
		147	10 kA	400	10 kA	400	70 kA	200
		187	18 kA	500	18 kA	500	70 kA	300
		234	18 kA	700	18 kA	700	70 kA	400
		348	30 kA	1000	30 kA	1000	70 kA	600
		435	42 kA	1200	30 kA	1200	70 kA	800
		549	42 kA	1600	30 kA	1600	69 kA	1000
		625	42 kA	1600	30 kA	1600	69 kA	1200
		831	42 kA	1600	30 kA	1600	69 kA	1600
		850	42 kA	1600	42 kA	2000	74 kA	1600
		900	42 kA	1600	42 kA	2000	74 kA	1600
		1200	85 kA	3000	85 kA	3200	85 kA	3000
		1600	85 kA	3000	85 kA	3200	85 kA	3000

	SCPD Performance 690V		Type 1		
	SCCR List✶	Device Rating	Max. Standard Available Fault	Max. Ampere Tested — North American Style	Max. Ampere Tested — European Style
	Maximum FLC	108	70 kA	A070URD33xxx500	6,9 gRB 73xxx400 6,6URD33xxx500
		135	70 kA	A070URD33xxx500	6,9 gRB 73xxx400 6,6URD33xxx500
		201	70 kA	A070URD33xxx700	6,9 gRB 73xxx630 6,6URD33xxx700
		251	70 kA	A070URD33xxx700	6,9 gRB 73xxx630 6,6URD33xxx700
		317	70 kA	A070URD33xxx900	6,9 gRB 73xxx800 6,6URD33xxx900
		361	70 kA	A070URD33xxx900	6,9 gRB 73xxx800 6,6URD33xxx900
		480	70 kA	A070D33xxx1250 A100URD73xxx1250	9 URD 73xxx1250 6,6URD33xxx1250
		625	70 kA	A070URD33xxx1400	6,6URD33xxx1400
		780	70 kA	A070URD33xxx1400	6,6URD33xxx1400
		970	85 kA	2 fuses in parallel A070URD33xxx1250	2 fuses in parallel 6,6URD33xxx1250
		1250	85 kA	2 fuses in parallel A070URD33xxx1250	2 fuses in parallel 6,6URD33xxx1250

✶ Consult local codes for proper sizing of short circuit protection.
❄ Non-time delay fuses (K5 — 5…480V (8.7…831 A) devices; Class L — 625…1250V (850…1600 A) devices).
‡ High capacity fault rating when used with time delay class CC, J, or L fuses.

Electrical Ratings					
Power Requirements	Control Module	1…480 A	120…240V AC	Transformer	75 VA
			24V AC	Transformer	130 VA
			24V DC	Inrush Current	5 A
				Inrush Time	250 ms
				Transient Watts	60 W
				Transient Time	500 ms
				Steady State Watts	24 W
				Minimum Allen-Bradley Power Supply	1606-XLP50E
		625…1250 A	751 VA (recommended 800 VA)		
	Heatsink Fan(s) (A)♣		5…135 A, 20 VA		
			201…251 A, 40 VA		
			317…480 A, 60 VA		
			625…1250 A, 150 VA		
Steady State Heat Dissipation with Control and Fan Power (Watts)	Controller Rating (A)	5	70		
		25	70		
		43	81		
		60	97		
		85	129		
		108	91		
		135	104		
		201	180		
		251	198		
		317	225		
		361	245		
		480	290		
		625	446		
		780	590		
		970	812		
		1250	1222		
Auxiliary Contacts 19/20 (Aux #1) 29/30 (Aux #2) 31/32 (Aux #3) 33/34 (Aux #4)	Type of Control Circuit		Electromagnetic relay		
	Number of Contacts		1		
	Type of Contacts		programmable N.O./N.C.		
	Type of Current		AC		
	Rated Operational Current		3 A @ 120V AC, 1.5 A @ 240V AC		
	Conventional Thermal Current I_{th} AC/DC		5 A		
	Make/Break VA		3600/360		
	Utilization Category		AC-15/DC		
PTC Input Ratings	Response Resistance		3400 Ω ±150 Ω		
	Reset Resistance		1600 Ω ±100 Ω		
	Short-Circuit Trip Resistance		25 Ω ±10 Ω		
	Max. Voltage at PTC Terminals (R_{PTC} = 4 kΩ)		< 7.5V		
	Max. Voltage at PTC Terminals (R_{PTC} = open)		30V		
	Max. No. of Sensors.		6		
	Max. Cold Resistance of PTC Sensor Chain		1500 Ω		
	Response Time		800 ms		
Tach Input			0…5V DC, 4.5V DC = 100% Speed		

♣ Heatsink fans can be powered by either 110/120V AC or 220/240V AC.

Environmental	
Operating Temperature Range	-5…50 °C (23…122 °F) (open) -5…40 °C (23…104 °F) (enclosed)
Storage and Transportation Temperature Range	–20…+75 °C
Altitude	2000 m (6560 ft)
Humidity	5…95% (non-condensing)
Pollution Degree	2

Mechanical			
Resistance to Vibration	Operational	All	1.0 G Peak, 0.15 mm (0.006 in.) displacement
	Non-Operational	5…480 A	2.5 G Peak, 0.38 mm (0.015 in.) displacement
		625…1250 A	1.0 G Peak, 0.15 mm (0.006 in.) displacement
Resistance to Shock	Operational	5…85 A	15 G
		108…480 A	5.5 G
		625…1250 A	4 G
	Non-Operational	5…85 A	30 G
		108…480 A	25 G
		625…1250 A	12 G
Construction	Power Poles	5…85 A	Heatsink thyristor modular design
	Power Poles	108…1250 A	Heatsink hockey puck thyristor modular design
	Control Modules		Thermoset and Thermoplastic Moldings
	Metal Parts		Plated Brass, Copper, or Painted Steel
Terminals	Power Terminals	5…85 A	Cable size — Line Upper — 2.5…95 mm² (14…3/0 AWG) Line Lower — 0.8…2.5 mm² (18…14 AWG) Load Upper — 2.5…50 mm² (14…1 AWG) Load Lower — 0.8…2.5 mm² (18…14 AWG) Tightening torque — 14.7 N•m (130 lb.-in.) Wire strip length — 18…20 mm (0.22…0.34 in.)
		108…135 A	One M10 x 1.5 diameter hole per power pole
		201…251 A	Two M10 x 1.5 diameter holes per power pole
		317…480 A	Two M12 x 1.75 diameter holes per power pole
		625…1250 A	Two 13.5 mm (0.53 in.) diameter holes per power pole
	Power Terminal Markings		NEMA, CENELEC EN50 012
	Control Terminals	M3 screw clamp	Clamping yoke connection

Other				
EMC Emission Levels	Conducted Radio Frequency Emissions Radiated Emissions		Class A Class A	
EMC Immunity Levels	Electrostatic Discharge Radio Frequency Electromagnetic Field Fast Transient Surge Transient		8 kV Air Discharge Per EN/IEC 60947-4-2 Per EN/IEC 60947-4-2 Per EN/IEC 60947-4-2	
Overload Characteristics	Current Range		Line	Delta
		5	1...5	1.7…9
		25	5...25	8.6…43
		43	8.6...43	14.8…75
		60	12...60	20.8…104
		85	17...85	29.4…147
		108	27…108	47…187
		135	34…135	59…234
		201	67…201	116…348
		251	84…251	145…435
		317	106…317	183…549
		361	120…361	208…625
		480	160…480	277…831
		625	208…625	283…850
		780	260…780	300…900
		970	323…970	400…1200
		1250	416…1250	533…1600
	Trip Classes Trip Current Rating Number of Poles		10, 15, 20, and 30 117% of Motor FLC 3	
Certifications	Open Type Controllers		CE Marked Per Low Voltage Directive 73/23/EEC, 93/68/EEC UL Listed (File No. E96956)	

Approximate Dimensions and Shipping Weights

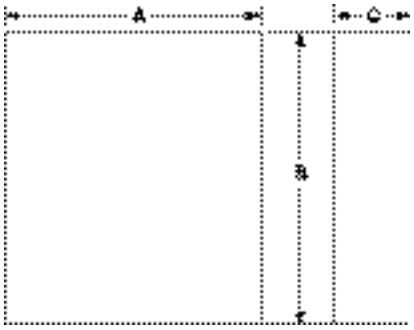
Open Type Controllers

Dimensions are in millimeters (inches).
Dimensions are not intended for manufacturing purposes.

Rating (A)	Height	Width	Depth	Weight
5…85	321 (12.6)	150 (5.9)	203 (8.0)	5.7 kg (12.6 lbs)
108…135	443.7 (17.47)	196.4 (7.74)	205.2 (8.08)	15.0 kg (33 lbs).
201…251	560 (22.05)	225 (8.86)	253.8 (9.99)	30.4 kg (67 lbs).
317…480	600 (23.62)	290 (11.42)	276.5 (10.89)	45.8 kg (101 lbs)
625…780	1041.1 (41.0)	596.9 (23.5)	346.2 (13.63)	179 kg (395 lbs)
970…1250	1041.1 (41.0)	596.9 (23.5)	346.2 (13.63)	224 kg (495 lbs)

Enclosed Type Line-Connected Controllers

Factory-installed options may affect enclosure size requirements.
Exact dimensions can be obtained after order entry. Please consult your local Allen-Bradley distributor.



Controller Rating (A)	Disconnect Rating (A)	IP65 (Type 4/12)		
		B Height	A Width	C Depth
Non-Combination Controller				
5	—	610 (24)	406 (16)	254 (10)
25	—	610 (24)	406 (16)	254 (10)
43	—	610 (24)	406 (16)	254 (10)
60	—	610 (24)	406 (16)	254 (10)
85	—	610 (24)	406 (16)	254 (10)
108	—	762 (30)	610 (24)	305 (12)
135	—	762 (30)	610 (24)	305 (12)
201	—	965 (38)	762 (30)	356 (14)
251	—	965 (38)	762 (30)	356 (14)
317	—	1295 (51)	914 (36)	356 (14)
361	—	1295 (51)	914 (36)	356 (14)
480	—	1295 (51)	914 (36)	356 (14)
625	—	2286 (90)	762 (30)	508 (20)
780	—	2286 (90)	762 (30)	508 (20)
970∗	—	2286 (90)	762 (30)	508 (20)
1250∗	—	2286 (90)	762 (30)	508 (20)

∗ 970…1250 rated devices are only available as Type 1and require a door-mounted fan, capable of delivering 240 cfm.

Approximate Dimensions and Shipping Weights, Continued

Controller Rating (A)	Disconnect Rating (A)	IP65 (Type 4/12)		
		B Height	A Width	C Depth
Combination Controllers with Fusible Disconnect				
5	30 A/J	610 (24)	406 (16)	254 (10)
25	30 A/J	610 (24)	406 (16)	254 (10)
43	60 A/J	610 (24)	406 (16)	254 (10)
60	100 A/J	610 (24)	406 (16)	254 (10)
85	100 A/J	610 (24)	406 (16)	254 (10)
108	200 A/J	965 (38)	762 (30)	356 (14)
135	200 A/J	965 (38)	762 (30)	356 (14)
201	400 A/J	965 (38)	762 (30)	356 (14)
251	400 A/J	965 (38)	762 (30)	356 (14)
317	600 A/J	1524 (60)	965 (38)	356 (14)
361	600 A/J	1524 (60)	965 (38)	356 (14)
480 ❄	600 A/J	1524 (60)	965 (38)	356 (14)
480 ‡	800 A/L	2286 (90)	508 (20)	508 (20)
625	—	2286 (90)	1397 (55)	508 (20)
780	—	2286 (90)	1397 (55)	508 (20)
970∗	—	2286 (90)	1651 (65)	508 (20)
1250∗	—	2286 (90)	1651 (65)	508 (20)
Combination Controllers with Circuit Breaker				
5	15 A	610 (24)	406 (16)	254 (10)
25	30 A	610 (24)	406 (16)	254 (10)
43	80 A	610 (24)	406 (16)	254 (10)
60	100 A	610 (24)	406 (16)	254 (10)
85	125 A	610 (24)	406 (16)	254 (10)
108	175 A/175 A Plug	965 (38)	762 (30)	356 (14)
135	225 A/225 A Plug	965 (38)	762 (30)	356 (14)
201	300 A/300 A Plug	965 (38)	762 (30)	356 (14)
251	400 A/400 A Plug	965 (38)	762 (30)	356 (14)
317	600 A/500 A Plug	1295 (51)	914 (36)	356 (14)
361	600 A/600 A Plug	1295 (51)	914 (36)	356 (14)
480	800 A/800 A Plug	1295 (51)	914 (36)	356 (14)
625	—	2286 (90)	1397 (55)	508 (20)
780	—	2286 (90)	1397 (55)	508 (20)
970∗	—	2286 (90)	1651 (65)	508 (20)
1250∗	—	2286 (90)	1651 (65)	508 (20)

❄ Use this row for 460V -58 and 575V -59.
‡ Use this row for 460V -59 and 575V -60 and -61.
∗ 970…1250 rated devices are only available as Type 1and require a door-mounted fan, capable of delivering 240 cfm.

Bulletin 150 — Smart Motor Controllers — SMC-3 Smart Motor Controller

The SMC-3 is a compact, simple to use, solid-state motor controller designed to operate 3-phase motors. It features a built-in overload relay and a built-in SCR bypass contactor on all three phases, allowing a smaller footprint than other soft starters on the market. This product is designed for many applications, including compressors, chillers, pumps, conveyors, and crushers. Modes of operation for the controller are as follows:

- Soft Start
- Current Limit Start
- Soft Stop
- Kick Start

The controllers offer two voltage ranges: 200…480V AC and 200…600V AC. All voltage ranges will operate at either 50 or 60 Hz.

- 1…480 A Range
- Built-In Electronic Motor Overload Protection
- Built-In SCR/Run Bypass
- Delta Compatibility

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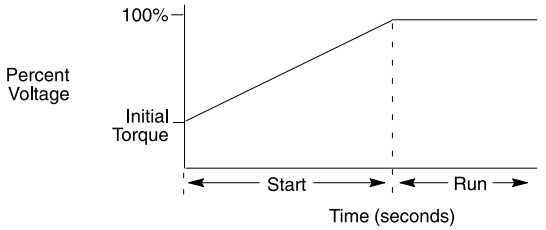
Standards Compliance/Approvals

- UL 508
- CSA C22.2 No. 14
- EN/IEC 60947-4-2
- cULus Listed (Open Type) (File No. E96956)
- CE Marked (Open Type) per EMC Directive and Low Voltage Directive

Modes of Operation

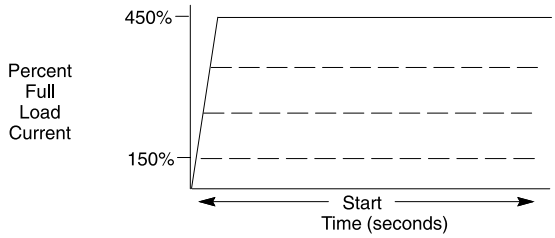
Soft Start

This method has the most general application. The motor is raised from an initial torque value to full voltage. This initial torque can be adjusted to 0%, 25%, 35%, or 65% of locked rotor torque. The motor voltage is gradually increased during the acceleration ramp time, which can be adjusted from 2, 5, 10, 15, 20, 25, or 30 s.



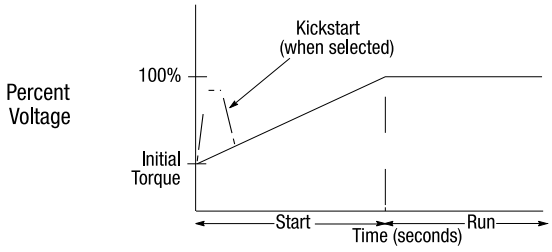
Current Limit Start

This starting mode is used when it is necessary to limit the maximum starting current. It can be adjusted to 150%, 250%, 350%, or 450% of full load amps. Start times are selectable from 2, 5, 10, 15, 20, 25, or 30 s.



Selectable Kick Start

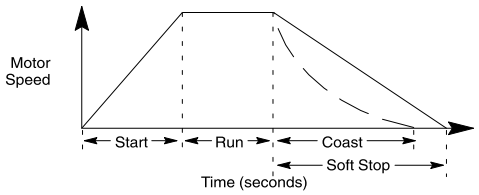
A kickstart, or boost, at the beginning of the start mode is intended to provide a current pulse of 450% of full load current. The kickstart time is adjustable from 0.5…1.5 seconds. This allows the motor to develop additional torque during starting for loads which may need a boost to get initial shaft rotation.



Modes of Operation, Continued

Soft Stop

The Soft Stop function can be used with applications that require an extended stop time. When enabled, the voltage ramp down time can be selected to one, two, or three times the starting time. The motor will stop when the motor voltage drops to a point where the load torque is greater than the motor torque.



Description of Features

Electronic Motor Overload Protection

The SMC-3 controller incorporates, as standard, electronic motor overload protection. This motor overload protection is accomplished electronically with the use of current transformers on each of the three phases. The controller's overload protection is programmable, providing the user with flexibility. The overload trip class selection consists of either OFF, 10, 15, or 20. The trip current is easily selected by adjusting the rotary potentiometer to the motor full load current rating. Trip reset is selectable to either automatic or manual mode.

Note: Trip rating is 120% of dial setting.

Over-temperature

The SMC-3 monitors the SCR temperature by means of internal thermistors. When the power poles maximum rated temperature is reached, the microcomputer switches off the SMC, a TEMP fault is indicated via LED, and the 97/98 fault contact closes.

Phase Reversal Protection

When enabled via a DIP switch, 3-phase input power will be verified before starting. If input power phasing is detected to be incorrect, the start will be aborted and a fault indicated.

Phase Loss/Open Load

The unit will not attempt a start if there is a single-phase condition on the line. This protects from motor burnout during single-phase starting.

Phase Imbalance

The unit monitors for imbalance between phase currents. To prevent motor damage, the unit will trip if the difference between the minimum phase current and the maximum phase current exceeds 65% for 3 seconds, and a fault will be indicated.

Shorted SCR

Prior to every start and during starting, the unit will check all SCRs for shorts and unit load connections to the motor. If there is a shorted SCR in the SMC-3 and/or open load, the start will be aborted and a shorted SCR or open load fault will be indicated. This prevents damage from phase imbalance.

Push to Test

The unit with control wiring can be tested for fault conditions by using the Push to Test function. Hold down the Reset button for 7 seconds to activate the fault Aux (97, 98) and shut down the SMC-3. To clear, either push the Reset button or cycle control power to the device.

LED Description (Number of Flashes)

1. Overload
2. Overtemperature
3. Phase Reversal
4. Phase Loss/Open Load
5. Phase Imbalance
6. Shorted SCR
7. Test

Smart Motor Controllers — SMC™-3

Cat. No. Explanation

Open and Non-Combination

150	–	C	30	F	B	D	–	8L
a		*b*	*c*	*d*	*e*	*f*		*g*

a

Bulletin Number	
Code	Description
150	Solid-State Controller

b

Controller Type	
Code	Description
C	SMC-3

c

Ampere Ratings	
Code	Description
3	3 A
9	9 A
16	16 A
19	19 A
25	25 A
30	30 A
37	37 A
43	43 A
60	60 A
85	85 A
108	108 A
135	135 A
201	201 A
251	251 A
317	317 A
361	361 A
480	480 A

d

Enclosure Type	
Code	Description
N	Open
F	IP65 (NEMA 4/12)

e

Input Line Voltage Open Type	
Code	Description
B	200…460V AC, 3-Phase, 50/60 Hz
C	200…600V AC, 3-Phase, 50/60 Hz
Non-Combination Enclosed Only	
H	200…208V AC, 3-Phase, 50/60 Hz
A	230V AC, 3-Phase, 50/60 Hz
B	400…460V AC, 3-Phase, 50/60 Hz
C	500…575V AC, 3-Phase, 50/60 Hz

f

Control Voltage	
Code	Description
D	100…240V AC
R	24V AC/DC (Open Type only)

g

Options	
Code	Description
8L	Line Mounted Protective Module (Enclosed Type only)

Combination

152H	–	C	30	F	BD	43	–	8L
a		*b*	*c*	*d*	*e*	*f*		*g*

a

Bulletin Number	
Code	Description
152H	Solid-State Controller with Fusible Disconnect
153H	Solid-State Controller with Circuit Breaker

b

Controller Type	
Code	Description
C	SMC-3

c

Ampere Ratings	
Code	Description
3	3 A
9	9 A
16	16 A
19	19 A
25	25 A
30	30 A
37	37 A
43	43 A
60	60 A
85	85 A
108	108 A
135	135 A
201	201 A
251	251 A
317	317 A
361	361 A
480	480 A

d

Enclosure Type	
Code	Description
F	IP65 (NEMA 4/12)

e

Input Line Voltage Open Type	
Code	Description
HD	200…208V AC, 3-Phase, 50/60 Hz
AD	230V AC, 3-Phase, 50/60 Hz
BD	400…460V AC, 3-Phase, 50/60 Hz
CD	500…575V AC, 3-Phase, 50/60 Hz

f

Horsepower									
Cat. No.	Hp Rating	Cat. No.	Hp Rating	Cat. No.	Hp Rating	Cat. No.	Hp Rating	Cat. No.	Hp Rating
33	0.5	39	5	46	40	52	150	60	450
34	0.75	40	7.5	47	50	54	200	61	500
35	1	41	10	48	60	56	250	62	600
36	1.5	42	15	49	75	57	300	63	700
37	2	43	20	50	100	58	350	65	800
38	3	44	25	51	125	59	400	67	1000
—	—	45	30	—	—	—	—	—	—

g

Options	
Code	Description
8L	Line Mounted Protective Module (Enclosed Type only)

Open Type and Non-Combination Enclosed (IP65, NEMA 4/12) Controllers — For use with Line-Connected Motors

Rated Voltage [V AC]	Motor Current (A)❄	Max. kW, 50Hz	Max. Hp, 60 Hz	Control Power	Open Type — Line-Connected Motors	IP65 (Type 4/12) Enclosed Non-Combination Controllers§
					Cat. No.	Cat. No.
200/208	1…3	—	0.5	100…240V AC, 50/60 Hz	150-C3NBD	150-C3FHD
		—		24V AC/DC	150-C3NBR	—
	3…9	—	0.75…2	100…240V AC, 50/60 Hz	150-C9NBD	150-C9FHD
		—		24V AC/DC	150-C9NBR	—
	5.3…16	—	1.5…3	100…240V AC, 50/60 Hz	150-C16NBD	150-C16FHD
		—		24V AC/DC	150-C16NBR	—
	6.3…19	—	1.5…3	100…240V AC, 50/60 Hz	150-C19NBD	150-C25FHD
		—		24V AC/DC	150-C19NBR	—
	9.2…27.7	—	3…7.5	100…240V AC, 50/60 Hz	150-C25NBD	150-C25FHD
		—		24V AC/DC	150-C25NBR	—
	10…30	—	3…7.5	100…240V AC, 50/60 Hz	150-C30NBD	150-C30FHD
		—		24V AC/DC	150-C30NBR	—
	12.3…37	—	5…10	100…240V AC, 50/60 Hz	150-C37NBD	150-C37FHD
		—		24V AC/DC	150-C37NBR	—
	14.3…43	—	5…10	100…240V AC, 50/60 Hz	150-C43NBD	150-C43FHD
		—		24V AC/DC	150-C43NBR	—
	20…60	—	7.5…15	100…240V AC, 50/60 Hz	150-C60NBD	150-C60FHD
		—		24V AC/DC	150-C60NBR	—
	28.3…85	—	10…25	100…240V AC, 50/60 Hz	150-C85NBD	150-C85FHD
		—		24V AC/DC	150-C85NBR	—
	27…108	—	20…30	100…240V AC, 50/60 Hz	150-C108NBD	150-C108FHD
		—		24V AC/DC♣	150-C108NBR	—
	34…135	—	25…40	100…240V AC, 50/60 Hz	150-C135NBD	150-C135FHD
		—		24V AC/DC♣	150-C135NBR	—
	67…201	—	40…60	100…240V AC, 50/60 Hz	150-C201NBD	150-C201FHD
		—		24V AC/DC♣	150-C201NBR	—
	84…251	—	50…75	100…240V AC, 50/60 Hz	150-C251NBD	150-C251FHD
		—		24V AC/DC♣	150-C251NBR	—
	106…317	—	60…100	100…240V AC, 50/60 Hz	150-C317NBD	150-C317FHD
		—		24V AC/DC♣	150-C317NBR	—
	120…361	—	75…125	100…240V AC, 50/60 Hz	150-C361NBD	150-C361FHD
		—		24V AC/DC♣	150-C361NBR	—
	160…480	—	100…150	100…240V AC, 50/60 Hz	150-C480NBD	150-C480FHD
		—		24V AC/DC♣	150-C480NBR	—

❄ Motor FLA rating should fall within specified current range for unit to operate properly.
§ These controllers require a separate 100…240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.
♣ Separate 120V or 240V single phase is required for fan operation.

Open Type and Non-Combination Enclosed (IP65, NEMA 4/12) Controllers — For use with Line-Connected Motors, Continued

Rated Voltage [V AC]	Motor Current (A)❄	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type — Line-Connected Motors	IP65 (Type 4/12) Enclosed Non-Combination Controllers§
					Cat. No.	Cat. No.
230	1…3	0.55	0.5	100…240V AC, 50/60 Hz	150-C3NBD	150-C3FAD
				24V AC/DC	150-C3NBR	—
	3…9	2.2	0.75…2	100…240V AC, 50/60 Hz	150-C9NBD	150-C9FAD
				24V AC/DC	150-C9NBR	—
	5.3…16	4	1.5…5	100…240V AC, 50/60 Hz	150-C16NBD	150-C16FAD
				24V AC/DC	150-C16NBR	—
	6.3…19	4	2…5	100…240V AC, 50/60 Hz	150-C19NBD	150-C25FAD
				24V AC/DC	150-C19NBR	—
	9.2…27.7	5.5	3…7.5	100…240V AC, 50/60 Hz	150-C25NBD	150-C25FAD
				24V AC/DC	150-C25NBR	—
	10…30	7.5	5…10	100…240V AC, 50/60 Hz	150-C30NBD	150-C30FAD
				24V AC/DC	150-C30NBR	—
	12.3…37	7.5	5…10	100…240V AC, 50/60 Hz	150-C37NBD	150-C37FAD
				24V AC/DC	150-C37NBR	—
	14.3…43	11	5…15	100…240V AC, 50/60 Hz	150-C43NBD	150-C43FAD
				24V AC/DC	150-C43NBR	—
	20…60	15	7.5…20	100…240V AC, 50/60 Hz	150-C60NBD	150-C60FAD
				24V AC/DC	150-C60NBR	—
	28.3…85	22	15…30	100…240V AC, 50/60 Hz	150-C85NBD	150-C85FAD
				24V AC/DC	150-C85NBR	—
	27…108	30	20…40	100…240V AC, 50/60 Hz	150-C108NBD	150-C108FAD
				24V AC/DC♣	150-C108NBR	—
	34…135	37	25…50	100…240V AC, 50/60 Hz	150-C135NBD	150-C135FAD
				24V AC/DC♣	150-C135NBR	—
	67…201	55	40…75	100…240V AC, 50/60 Hz	150-C201NBD	150-C201FAD
				24V AC/DC♣	150-C201NBR	—
	84…251	75	50…100	100…240V AC, 50/60 Hz	150-C251NBD	150-C251FAD
				24V AC/DC♣	150-C251NBR	—
	106…317	90	60…125	100…240V AC, 50/60 Hz	150-C317NBD	150-C317FAD
				24V AC/DC♣	150-C317NBR	—
	120…361	110	75…150	100…240V AC, 50/60 Hz	150-C361NBD	150-C361FAD
				24V AC/DC♣	150-C361NBR	—
	160…480	132	100…200	100…240V AC, 50/60 Hz	150-C480NBD	150-C480FAD
				24V AC/DC♣	150-C480NBR	—

❄ Motor FLA rating should fall within specified current range for unit to operate properly.

§ These controllers require a separate 100…240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.

♣ Separate 120V or 240V single phase is required for fan operation.

Open Type and Non-Combination Enclosed (IP65, NEMA 4/12) Controllers — For use with Line-Connected Motors, Continued

Rated Voltage [V AC]	Motor Current (A)❄	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type — Line-Connected Motors	IP65 (Type 4/12) Enclosed Non-Combination Controllers§
					Cat. No.	Cat. No.
380/400/415/460	1…3	1.1	0.5…1.5	100…240V AC, 50/60 Hz	150-C3NBD	150-C3FBD
				24V AC/DC	150-C3NBR	—
	3…9	4	1.5…5	100…240V AC, 50/60 Hz	150-C9NBD	150-C9FBD
				24V AC/DC	150-C9NBR	—
	5.3…16	7.5	5…10	100…240V AC, 50/60 Hz	150-C16NBD	150-C16FBD
				24V AC/DC	150-C16NBR	—
	6.3…19	7.5	5…10	100…240V AC, 50/60 Hz	150-C19NBD	150-C25FBD
				24V AC/DC	150-C19NBR	—
	9.2…27.7	11	7.5…15	100…240V AC, 50/60 Hz	150-C25NBD	150-C25FBD
				24V AC/DC	150-C25NBR	—
	10…30	15	7.5…20	100…240V AC, 50/60 Hz	150-C30NBD	150-C30FBD
				24V AC/DC	150-C30NBR	—
	12.3…37	18.5	10…25	100…240V AC, 50/60 Hz	150-C37NBD	150-C37FBD
				24V AC/DC	150-C37NBR	—
	14.3…43	22	10…30	100…240V AC, 50/60 Hz	150-C43NBD	150-C43FBD
				24V AC/DC	150-C43NBR	—
	20…60	30	15…40	100…240V AC, 50/60 Hz	150-C60NBD	150-C60FBD
				24V AC/DC	150-C60NBR	—
	28.3…85	45	25…60	100…240V AC, 50/60 Hz	150-C85NBD	150-C85FBD
				24V AC/DC	150-C85NBR	—
	27…108	55	50…75	100…240V AC, 50/60 Hz	150-C108NBD	150-C108FBD
				24V AC/DC♣	150-C108NBR	—
	34…135	75	60…100	100…240V AC, 50/60 Hz	150-C135NBD	150-C135FBD
				24V AC/DC♣	150-C135NBR	—
	67…201	95…110	75…150	100…240V AC, 50/60 Hz	150-C201NBD	150-C201FBD
				24V AC/DC♣	150-C201NBR	—
	84…251	95…132	100…200	100…240V AC, 50/60 Hz	150-C251NBD	150-C251FBD
				24V AC/DC♣	150-C251NBR	—
	106…317	95…160	125…250	100…240V AC, 50/60 Hz	150-C317NBD	150-C317FBD
				24V AC/DC♣	150-C317NBR	—
	120…361	110…200	250…300	100…240V AC, 50/60 Hz	150-C361NBD	150-C361FBD
				24V AC/DC♣	150-C361NBR	—
	160…480	160…250	300…400	100…240V AC, 50/60 Hz	150-C480NBD	150-C480FBD
				24V AC/DC♣	150-C480NBR	—

❄ Motor FLA rating should fall within specified current range for unit to operate properly.
§ These controllers require a separate 100…240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.
♣ Separate 120V or 240V single phase is required for fan operation.

Open Type and Non-Combination Enclosed (IP65, NEMA 4/12) Controllers — For use with Line-Connected Motors, Continued

Rated Voltage [V AC]	Motor Current (A)❄	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type — Line-Connected Motors	IP65 (Type 4/12) Enclosed Non-Combination Controllers§
					Cat. No.	Cat. No.
500/575	1…3	1.5	0.75…2	100…240V AC, 50/60 Hz	150-C3NCD	150-C3FCD
				24V AC/DC	150-C3NCR	—
	3…9	5.5	3…7.5	100…240V AC, 50/60 Hz	150-C9NCD	150-C9FCD
				24V AC/DC	150-C9NCR	—
	5.3…16	7.5	5…10	100…240V AC, 50/60 Hz	150-C16NCD	150-C16FCD
				24V AC/DC	150-C16NCR	—
	6.3…19	11	7.5…15	100…240V AC, 50/60 Hz	150-C19NCD	150-C25FCD
				24V AC/DC	150-C19NCR	—
	9.2…27.7	15	7.5…20	100…240V AC, 50/60 Hz	150-C25NCD	150-C25FCD
				24V AC/DC	150-C25NCR	—
	10…30	18.5	10…25	100…240V AC, 50/60 Hz	150-C30NCD	150-C30FCD
				24V AC/DC	150-C30NCR	—
	12.3…37	22	15…30	100…240V AC, 50/60 Hz	150-C37NCD	150-C37FCD
				24V AC/DC	150-C37NCR	—
	14.3…43	22	15…40	100…240V AC, 50/60 Hz	150-C43NCD	150-C43FCD
				24V AC/DC	150-C43NCR	—
	20…60	37	20…50	100…240V AC, 50/60 Hz	150-C60NCD	150-C60FCD
				24V AC/DC	150-C60NCR	—
	28.3…85	55	30…75	100…240V AC, 50/60 Hz	150-C85NCD	150-C85FCD
				24V AC/DC	150-C85NCR	—
	27…108	75	60…100	100…240V AC, 50/60 Hz	150-C108NCD	150-C108FCD
				24V AC/DC♣	150-C108NCR	—
	34…135	90	75…125	100…240V AC, 50/60 Hz	150-C135NCD	150-C135FCD
				24V AC/DC♣	150-C135NCR	—
	67…201	75…132	100…200	100…240V AC, 50/60 Hz	150-C201NCD	150-C201FCD
				24V AC/DC♣	150-C201NCR	—
	84…251	90…160	125…250	100…240V AC, 50/60 Hz	150-C251NCD	150-C251FCD
				24V AC/DC♣	150-C251NCR	—
	106…317	100…200	200…300	100…240V AC, 50/60 Hz	150-C317NCD	150-C317FCD
				24V AC/DC♣	150-C317NCR	—
	120…361	132…250	200…350	100…240V AC, 50/60 Hz	150-C361NCD	150-C361FCD
				24V AC/DC♣	150-C361NCR	—
	160…480	200…315	250…500	100…240V AC, 50/60 Hz	150-C480NCD	150-C480FCD
				24V AC/DC♣	150-C480NCR	—

❄ Motor FLA rating should fall within specified current range for unit to operate properly.

§ These controllers require a separate 100…240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.

♣ Separate 120V or 240V single phase is required for fan operation.

Open Type Controllers — For use with Delta-Connected Motors

Rated Voltage [V AC]	Motor Current (A)❄	Max. kW, 50Hz	Max. Hp, 60 Hz	Control Power	Open Type Cat. No.
200/208	1.7…5.1	—	1	100…240V AC, 50/60 Hz	150-C3NBD
		—		24V AC/DC	150-C3NBR
	5.1…16	—	1.5…3	100…240V AC, 50/60 Hz	150-C9NBD
		—		24V AC/DC	150-C9NBR
	9.1…27.6	—	3…7.5	100…240V AC, 50/60 Hz	150-C16NBD
		—		24V AC/DC	150-C16NBR
	10.9…32.8	—	3…10	100…240V AC, 50/60 Hz	150-C19NBD
		—		24V AC/DC	150-C19NBR
	14.3…43	—	3…10	100…240V AC, 50/60 Hz	150-C25NBD
		—		24V AC/DC	150-C25NBR
	17.3…52	—	5…10	100…240V AC, 50/60 Hz	150-C30NBD
		—		24V AC/DC	150-C30NBR
	21…64	—	7.5…20	100…240V AC, 50/60 Hz	150-C37NBD
		—		24V AC/DC	150-C37NBR
	25…74	—	7.5…20	100…240V AC, 50/60 Hz	150-C43NBD
		—		24V AC/DC	150-C43NBR
	34.6…104	—	15…30	100…240V AC, 50/60 Hz	150-C60NBD
		—		24V AC/DC	150-C60NBR
	50…147	—	15…40	100…240V AC, 50/60 Hz	150-C85NBD
		—		24V AC/DC	150-C85NBR
	47…187	—	20…60	100…240V AC, 50/60 Hz	150-C108NBD
		—		24V AC/DC♣	150-C108NBR
	59…234	—	20…75	100…240V AC, 50/60 Hz	150-C135NBD
		—		24V AC/DC♣	150-C135NBR
	116…348	—	75…100	100…240V AC, 50/60 Hz	150-C201NBD
		—		24V AC/DC♣	150-C201NBR
	145…435	—	100…150	100…240V AC, 50/60 Hz	150-C251NBD
		—		24V AC/DC♣	150-C251NBR
	183…549	—	100…200	100…240V AC, 50/60 Hz	150-C317NBD
		—		24V AC/DC♣	150-C317NBR
	208…625	—	125…200	100…240V AC, 50/60 Hz	150-C361NBD
		—		24V AC/DC♣	150-C361NBR
	277…831	—	200…300	100…240V AC, 50/60 Hz	150-C480NBD
		—		24V AC/DC♣	150-C480NBR

❄ Motor FLA rating should fall within specified current range for unit to operate properly.
♣ Separate 120V or 240V single phase is required for fan operation.

Open Type Controllers — For use with Delta-Connected Motors, Continued

Rated Voltage [V AC]	Motor Current (A)❄	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type Cat. No.
230	1.7…5.1	0.25…1.1	1	100…240V AC, 50/60 Hz	150-C3NBD
				24V AC/DC	150-C3NBR
	5.1…16	1.1…4	1…5	100…240V AC, 50/60 Hz	150-C9NBD
				24V AC/DC	150-C9NBR
	9.1…27.6	2.2…7.5	3…10	100…240V AC, 50/60 Hz	150-C16NBD
				24V AC/DC	150-C16NBR
	10.9…32.8	2.2…7.5	3…10	100…240V AC, 50/60 Hz	150-C19NBD
				24V AC/DC	150-C19NBR
	14.3…43	4…11	3…15	100…240V AC, 50/60 Hz	150-C25NBD
				24V AC/DC	150-C25NBR
	17.3…52	4…15	5…15	100…240V AC, 50/60 Hz	150-C30NBD
				24V AC/DC	150-C30NBR
	21…64	5.5…18.5	7.5…20	100…240V AC, 50/60 Hz	150-C37NBD
				24V AC/DC	150-C37NBR
	25…74	5.5…22	7.5…25	100…240V AC, 50/60 Hz	150-C43NBD
				24V AC/DC	150-C43NBR
	34.6…104	7.5…30	15…40	100…240V AC, 50/60 Hz	150-C60NBD
				24V AC/DC	150-C60NBR
	50…147	15…45	20…50	100…240V AC, 50/60 Hz	150-C85NBD
				24V AC/DC	150-C85NBR
	47…187	55	20…60	100…240V AC, 50/60 Hz	150-C108NBD
				24V AC/DC♣	150-C108NBR
	59…234	75	25…75	100…240V AC, 50/60 Hz	150-C135NBD
				24V AC/DC♣	150-C135NBR
	116…348	110	75…125	100…240V AC, 50/60 Hz	150-C201NBD
				24V AC/DC♣	150-C201NBR
	145…435	132	100…150	100…240V AC, 50/60 Hz	150-C251NBD
				24V AC/DC♣	150-C251NBR
	183…549	160	125…200	100…240V AC, 50/60 Hz	150-C317NBD
				24V AC/DC♣	150-C317NBR
	208…625	200	150…250	100…240V AC, 50/60 Hz	150-C361NBD
				24V AC/DC♣	150-C361NBR
	277…831	250	200…300	100…240V AC, 50/60 Hz	150-C480NBD
				24V AC/DC♣	150-C480NBR

❄ Motor FLA rating should fall within specified current range for unit to operate properly.
♣ Separate 120V or 240V single phase is required for fan operation.

Open Type Controllers — For use with Delta-Connected Motors, Continued

Rated Voltage [V AC]	Motor Current (A)❄	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type Cat. No.
380/400/415/460	1.7…5.1	0.55…2.2	0.5…2	100…240V AC, 50/60 Hz	150-C3NBD
				24V AC/DC	150-C3NBR
	5.1…16	2.2…7.5	2…7.5	100…240V AC, 50/60 Hz	150-C9NBD
				24V AC/DC	150-C9NBR
	9.1…27.6	4…11	5…15	100…240V AC, 50/60 Hz	150-C16NBD
				24V AC/DC	150-C16NBR
	10.9…32.8	4…15	5…15	100…240V AC, 50/60 Hz	150-C19NBD
				24V AC/DC	150-C19NBR
	14.3…43	5.5…22	7.5…20	100…240V AC, 50/60 Hz	150-C25NBD
				24V AC/DC	150-C25NBR
	17.3…52	7.5…22	7.5…30	100…240V AC, 50/60 Hz	150-C30NBD
				24V AC/DC	150-C30NBR
	21…64	7.5…30	10…30	100…240V AC, 50/60 Hz	150-C37NBD
				24V AC/DC	150-C37NBR
	25…74	11…37	10…40	100…240V AC, 50/60 Hz	150-C43NBD
				24V AC/DC	150-C43NBR
	34.6…104	15…55	20…60	100…240V AC, 50/60 Hz	150-C60NBD
				24V AC/DC	150-C60NBR
	50…147	22…75	25…75	100…240V AC, 50/60 Hz	150-C85NBD
				24V AC/DC	150-C85NBR
	47…187	90	40…150	100…240V AC, 50/60 Hz	150-C108NBD
				24V AC/DC♣	150-C108NBR
	59…234	132	50…150	100…240V AC, 50/60 Hz	150-C135NBD
				24V AC/DC♣	150-C135NBR
	116…348	160	150…250	100…240V AC, 50/60 Hz	150-C201NBD
				24V AC/DC♣	150-C201NBR
	145…435	250	200…350	100…240V AC, 50/60 Hz	150-C251NBD
				24V AC/DC♣	150-C251NBR
	183…549	315	250…450	100…240V AC, 50/60 Hz	150-C317NBD
				24V AC/DC♣	150-C317NBR
	208…625	355	300…500	100…240V AC, 50/60 Hz	150-C361NBD
				24V AC/DC♣	150-C361NBR
	277…831	450	350…700	100…240V AC, 50/60 Hz	150-C480NBD
				24V AC/DC♣	150-C480NBR

❄ Motor FLA rating should fall within specified current range for unit to operate properly.
♣ Separate 120V or 240V single phase is required for fan operation.

Open Type Controllers — For use with Delta-Connected Motors, Continued

Rated Voltage [V AC]	Motor Current (A)❄	Max. kW, 50 Hz	Max. Hp, 60 Hz	Control Power	Open Type Cat. No.
500/575	1.7…5.1	0.75…3	1…3	100…240V AC, 50/60 Hz	150-C3NCD
				24V AC/DC	150-C3NCR
	5.1…16	3…7.5	3…10	100…240V AC, 50/60 Hz	150-C9NCD
				24V AC/DC	150-C9NCR
	9.1…27.6	5.5…15	7.5…25	100…240V AC, 50/60 Hz	150-C16NCD
				24V AC/DC	150-C16NCR
	10.9…32.8	5.5…22	7.5…30	100…240V AC, 50/60 Hz	150-C19NCD
				24V AC/DC	150-C19NCR
	14.3…43	7.5…22	10…40	100…240V AC, 50/60 Hz	150-C25NCD
				24V AC/DC	150-C25NCR
	17.3…52	11…30	15…50	100…240V AC, 50/60 Hz	150-C30NCD
				24V AC/DC	150-C30NCR
	21…64	11…37	15…60	100…240V AC, 50/60 Hz	150-C37NCD
				24V AC/DC	150-C37NCR
	25…74	15…45	20…60	100…240V AC, 50/60 Hz	150-C43NCD
				24V AC/DC	150-C43NCR
	34.6…104	22…55	30…100	100…240V AC, 50/60 Hz	150-C60NCD
				24V AC/DC	150-C60NCR
	50…147	30…90	40…150	100…240V AC, 50/60 Hz	150-C85NCD
				24V AC/DC	150-C85NCR
	47…187	132	50…150	100…240V AC, 50/60 Hz	150-C108NCD
				24V AC/DC♣	150-C108NCR
	59…234	160	60…200	100…240V AC, 50/60 Hz	150-C135NCD
				24V AC/DC♣	150-C135NCR
	116…348	250	250…300	100…240V AC, 50/60 Hz	150-C201NCD
				24V AC/DC♣	150-C201NCR
	145…435	315	250…400	100…240V AC, 50/60 Hz	150-C251NCD
				24V AC/DC♣	150-C251NCR
	183…549	400	300…500	100…240V AC, 50/60 Hz	150-C317NCD
				24V AC/DC♣	150-C317NCR
	208…625	450	350…600	100…240V AC, 50/60 Hz	150-C361NCD
				24V AC/DC♣	150-C361NCR
	277…831	560	400…900	100…240V AC, 50/60 Hz	150-C480NCD
				24V AC/DC♣	150-C480NCR

❄ Motor FLA rating should fall within specified current range for unit to operate properly.
♣ Separate 120V or 240V single phase is required for fan operation.

Combination Enclosed (IP65, NEMA 4/12) Controllers with Fusible Disconnect or Circuit Breaker

Rated Voltage [V AC]	Current Rating (A)	kW	Hp (0.5 = 1/2, 0.75 = 3/4, 7.5 = 7-1/2)	IP65 (Type 4/12) Enclosed Combination Controllers with Fusible Disconnect ❄	IP65 (Type 4/12) Enclosed Combination Controllers with Circuit Breaker ❄
				Cat. No.	Cat. No.
200/208	3	—	0.5	152H-C3FHD-33	153H-C3FHD-33
	9	—	0.75	152H-C9FHD-34	153H-C9FHD-34
	9	—	1	152H-C9FHD-35	153H-C9FHD-35
	9	—	1.5	152H-C9FHD-36	153H-C9FHD-36
	16	—	2	152H-C16FHD-37	153H-C16FHD-37
	16	—	3	152H-C16FHD-38	153H-C16FHD-38
	25	—	5	152H-C25FHD-39	153H-C25FHD-39
	37	—	7.5	152H-C37FHD-40	153H-C37FHD-40
	43	—	10	152H-C43FHD-41	153H-C43FHD-41
	60	—	15	152H-C60FHD-42	153H-C60FHD-42
	85	—	20	152H-C85FHD-43	153H-C85FHD-43
	85	—	25	152H-C85FHD-44	153H-C85FHD-44
	108	—	30	152H-C108FHD-45	153H-C108FHD-45
	135	—	40	152H-C135FHD-46	153H-C135FHD-46
	201	—	60	152H-C201FHD-48	153H-C201FHD-48
	251	—	75	152H-C251FHD-49	153H-C251FHD-49
	317	—	100	152H-C317FHD-50	153H-C317FHD-50
	361	—	125	152H-C361FHD-51	153H-C361FHD-51
	480	—	150	152H-C480FHD-52	153H-C480FHD-52
230	3	0.37	0.5	152H-C3FAD-33	153H-C3FAD-33
	9	0.55	0.75	152H-C9FAD-34	153H-C9FAD-34
	9	0.75	1	152H-C9FAD-35	153H-C9FAD-35
	9	1.1	1.5	152H-C9FAD-36	153H-C9FAD-36
	9	1.5	2	152H-C9FAD-37	153H-C9FAD-37
	16	2.2	3	152H-C16FAD-38	153H-C16FAD-38
	25	3.7	5	152H-C25FAD-39	153H-C25FAD-39
	30	5.5	7.5	152H-C30FAD-40	153H-C30FAD-40
	37	7.5	10	152H-C37FAD-41	153H-C37FAD-41
	43	11	15	152H-C43FAD-42	153H-C43FAD-42
	60	15	20	152H-C60FAD-43	153H-C60FAD-43
	85	18.5	25	152H-C85FAD-44	153H-C85FAD-44
	85	22	30	152H-C85FAD-45	153H-C85FAD-45
	108	30	40	152H-C108FAD-46	153H-C108FAD-46
	135	37	50	152H-C135FAD-47	153H-C135FAD-47
	201	55	75	152H-C201FAD-49	153H-C201FAD-49
	251	75	100	152H-C251FAD-50	153H-C251FAD-50
	317	90	125	152H-C317FAD-51	153H-C317FAD-51
	361	110	150	152H-C361FAD-52	153H-C361FAD-52
	480	147	200	152H-C480FAD-54	153H-C480FAD-54

❄ These controllers require a separate 100…240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.

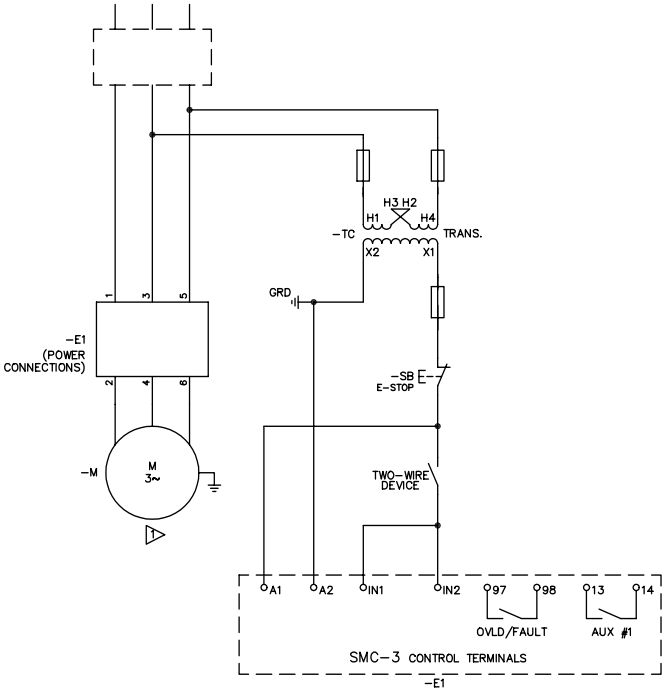
Combination Enclosed (IP65, NEMA 4/12) Controllers with Fusible Disconnect or Circuit Breaker, Continued

Rated Voltage [V AC]	Current Rating (A)	kW	Hp (0.5 = 1/2, 0.75 = 3/4, 7.5 = 7-1/2)	IP65 (Type 4/12) Enclosed Combination Controllers with Fusible Disconnect ❄	IP65 (Type 4/12) Enclosed Combination Controllers with Circuit Breaker ❄
				Cat. No.	Cat. No.
460	3	0.37	0.5	152H-C3FBD-33	153H-C3FBD-33
	3	0.55	0.75	152H-C3FBD-34	153H-C3FBD-34
	3	0.75	1	152H-C3FBD-35	153H-C3FBD-35
	9	1.1	1.5	152H-C9FBD-36	153H-C9FBD-36
	9	1.5	2	152H-C9FBD-37	153H-C9FBD-37
	9	2.2	3	152H-C9FBD-38	153H-C9FBD-38
	16	3.7	5	152H-C16FBD-39	153H-C16FBD-39
	16	5.5	7.5	152H-C16FBD-40	153H-C16FBD-40
	25	7.5	10	152H-C25FBD-41	153H-C25FBD-41
	30	11	15	152H-C30FBD-42	153H-C30FBD-42
	37	15	20	152H-C37FBD-43	153H-C37FBD-43
	43	18.5	25	152H-C43FBD-44	153H-C43FBD-44
	43	22	30	152H-C43FBD-45	153H-C43FBD-45
	60	30	40	152H-C60FBD-46	153H-C60FBD-46
	85	37	50	152H-C85FBD-47	153H-C85FBD-47
	85	45	60	152H-C85FBD-48	153H-C85FBD-48
	108	55	75	152H-C108FBD-49	153H-C108FBD-49
	135	75	100	152H-C135FBD-50	153H-C135FBD-50
	201	110	150	152H-C201FBD-52	153H-C201FBD-52
	251	147	200	152H-C251FBD-54	153H-C251FBD-54
	317	185	250	152H-C317FBD-56	153H-C317FBD-56
	361	220	300	152H-C361FBD-57	153H-C361FBD-57
	480	295	400	152H-C480FBD-59	153H-C480FBD-59
500/575	3	0.55	0.75	152H-C3FCD-34	153H-C3FCD-34
	3	0.75	1	152H-C3FCD-35	153H-C3FCD-35
	9	1.1	1.5	152H-C9FCD-36	153H-C9FCD-36
	9	1.5	2	152H-C9FCD-37	153H-C9FCD-37
	9	2.2	3	152H-C9FCD-38	153H-C9FCD-38
	9	3.7	5	152H-C9FCD-39	153H-C9FCD-39
	16	5.5	7.5	152H-C16FCD-40	153H-C16FCD-40
	16	7.5	10	152H-C16FCD-41	153H-C16FCD-41
	25	11	15	152H-C25FCD-42	153H-C25FCD-42
	30	15	20	152H-C30FCD-43	153H-C30FCD-43
	37	18.5	25	152H-C37FCD-44	153H-C37FCD-44
	43	22	30	152H-C43FCD-45	153H-C43FCD-45
	43	30	40	152H-C43FCD-46	153H-C43FCD-46
	60	37	50	152H-C60FCD-47	153H-C60FCD-47
	85	45	60	152H-C85FCD-48	153H-C85FCD-48
	85	55	75	152H-C85FCD-49	153H-C85FCD-49
	108	75	100	152H-C108FCD-50	153H-C108FCD-50
	135	90	125	152H-C135FCD-51	153H-C135FCD-51
	201	147	200	152H-C201FCD-54	153H-C201FCD-54
	251	185	250	152H-C251FCD-56	153H-C251FCD-56
	317	220	300	152H-C317FCD-57	153H-C317FCD-57
	361	257	350	152H-C361FCD-58	153H-C361FCD-58
	480	375	500	152H-C480FCD-61	153H-C480FCD-61

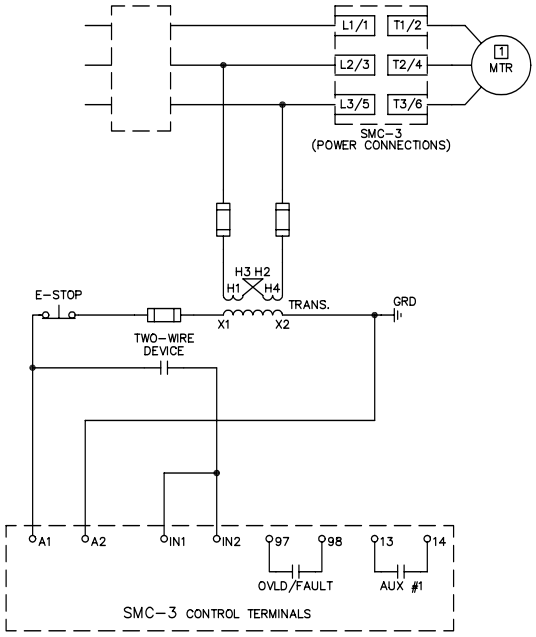
❄ These controllers require a separate 100…240V, 50/60 Hz single-phase control source. To add a control circuit transformer to the enclosure, add the appropriate option code to the catalog string.

Two-Wire Configuration

IEC

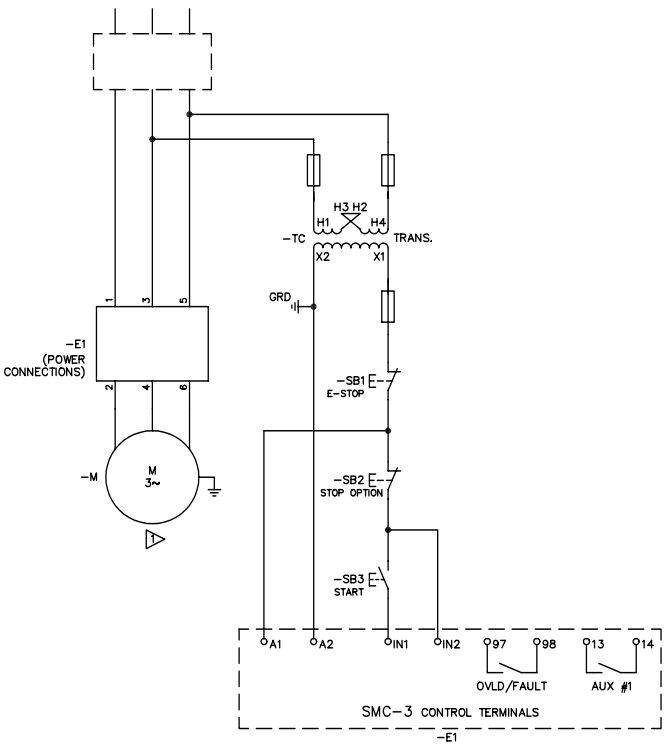


NEMA

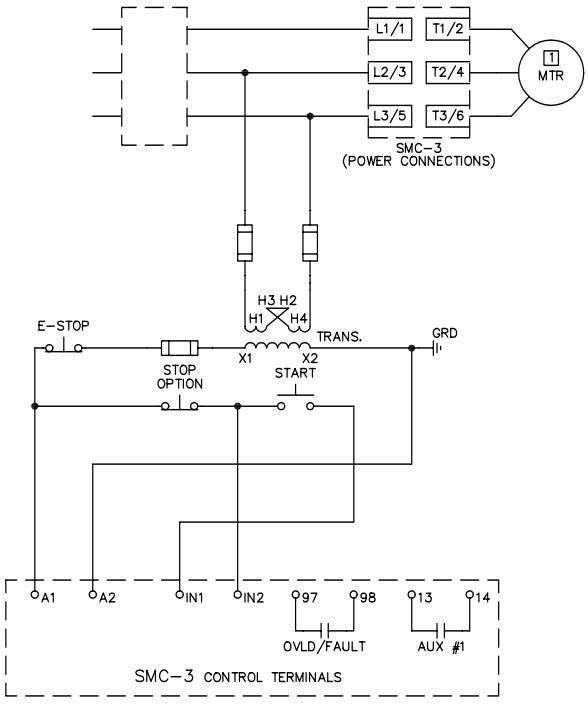


Three-Wire Configuration

IEC

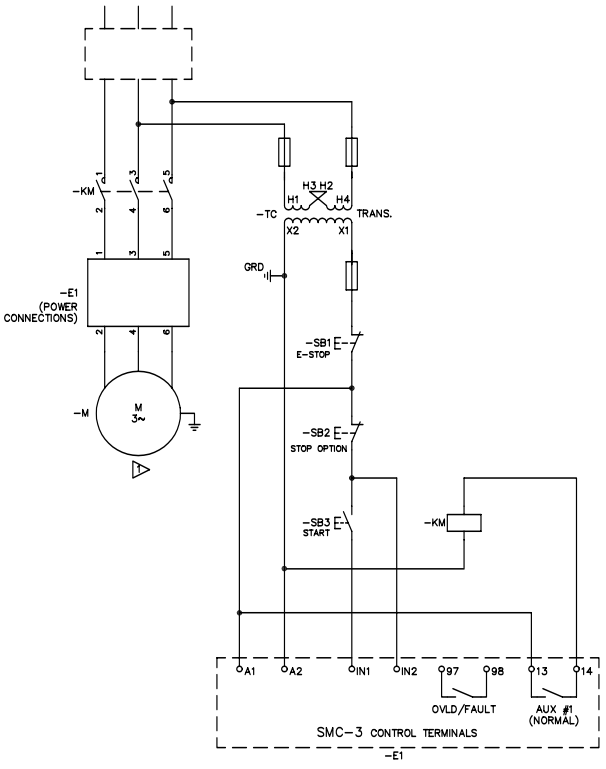


NEMA

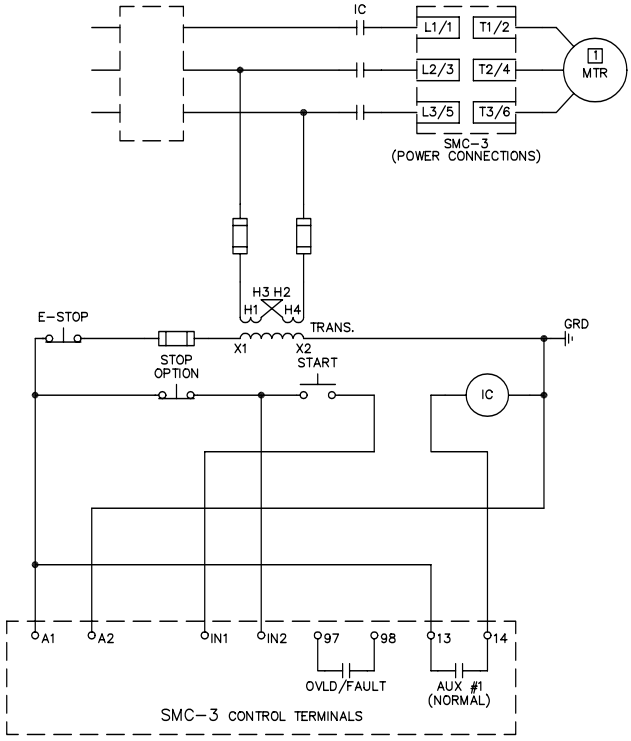


Isolation Contactor Configuration

IEC



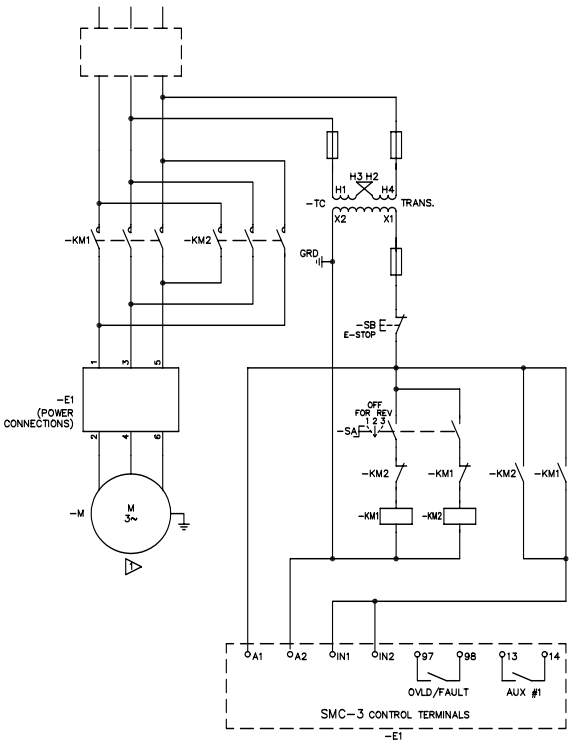
NEMA



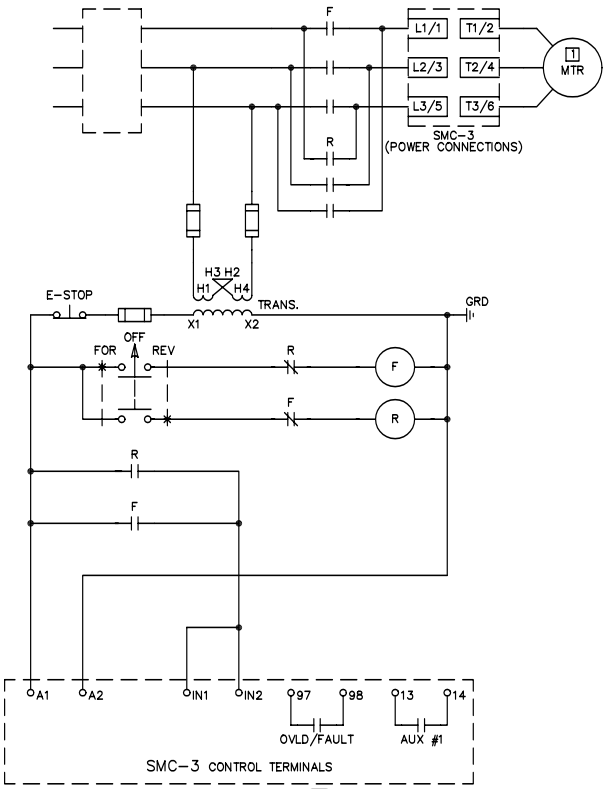
Reversing Configuration

Note: Minimum Off time equals 1.0 s.

IEC



NEMA



Standard Features							
Selectable Start Times	2, 5, 10, 15, 20, 25, or 30 s						
Selectable Initial Torque	0%, 25%, 35%, and 65% of locked rotor torque						
Selectable Current Limit	150%, 250%, 350%, and 450% of full load current						
Selectable Kick Start — 450% FLA	0, 0.5, 1.0, or 1.5 s						
Selectable Soft Stop	Off, 100%, 200%, or 300% of the start time setting when wired						

Electrical Ratings								
			UL/CSA/NEMA		IEC			
Power Circuit	Rated Operation Voltage		200…480V AC 200…600V AC		200…480V~ — 400V~			
	Rated Insulation Voltage		600V AC		500V~ — 500V~			
	Dielectric Withstand		2200V AC		500V~			
	Repetitive Peak		200…480V AC: 1400V 200…600V AC: 1600V		2500V~			
	Operating Frequency		50/60 Hz		200…480V~: 1400V			
	Utilization Category	1…37 A	—		500V~: 1600V			
		43…60 A	—		50/60 Hz			
		85 A	—		AC-53b: 3.5-15:3585			
		108 A	—		AC-53b: 4.5-30:1770			
		135 A	—		AC-53b: 4.5-30:3570			
		201…251 A	—		AC-53b: 3.5-30: 1770			
		317…480 A	—		AC-53b: 3.5-30: 1770			
	Number of Poles		Equipment designed for 3-phase only					
	Rated Impulse Voltage		6 kV					
	DV/DT Protection		1000V/µs					
	Overvoltage Category		III					
Short Circuit Protection	SCPD Performance		Type 1					
			Non-Time Delay		Thermal Magnetic Circuit Breaker		High Capacity Time Delay Class CC/J/L	
	SCPD List‡		Max. Standard Available Fault	Max. Standard Fuse (A)❄	Max. Standard Available Fault	Max. Circuit Breaker (A)	Max. Standard Available Fault	Max. Fuse (A)
	Line Device Operational Current Rating (A)	3	5 kA	12	5 kA	12	70 kA	6
		9	5 kA	30	5 kA	30	70 kA	15
		16	5 kA	60	5 kA	60	42 kA	30
		19	5 kA	70	5 kA	70	42 kA	40
		25	5 kA	100	5 kA	100	42 kA	50
		30	5 kA	110	5 kA	110	42 kA	60
		37	5 kA	125	5 kA	125	42 kA	60
		43	10 kA	150	10 kA	150	70 kA	90
		60	10 kA	225	10 kA	225	70 kA	125
		85	10 kA	300	10 kA	300	70 kA	175
		108	18 kA	400	18 kA	300	70 kA	200
		135	18 kA	500	18 kA	400	70 kA	225
		201	18 kA	600	18 kA	600	70 kA	350
		251	30 kA	700	30 kA	700	70 kA	400
		317	30 kA	800	30 kA	800	69 kA	500
		361	42 kA	1000	30 kA	1000	69 kA	600
		480	42 kA	1200	30 kA	1200	69 kA	800
	Delta Device Operational Current Rating (A)	5.1	5 kA	12	5 kA	12	70 kA	6
		16	5 kA	30	5 kA	30	70 kA	15
		27.6	5 kA	60	5 kA	60	42 kA	30
		32.8	5 kA	70	5 kA	70	42 kA	40
		43	5 kA	100	5 kA	100	42 kA	50
		52	5 kA	110	5 kA	110	42 kA	60
		64	5 kA	125	5 kA	125	42 kA	60
		74	10 kA	250	10 kA	250	70 kA	150
		104	10 kA	400	10 kA	300	70 kA	200
		147	10 kA	400	10 kA	400	70 kA	200
		187	18 kA	600	18 kA	500	70 kA	300
		234	18 kA	700	18 kA	700	70 kA	400
		348	18 kA	1000	18 kA	1000	70 kA	600
		435	30 kA	1200	30 kA	1200	69 kA	800
		549	30 kA	1600	30 kA	1600	69 kA	1000
		625	42 kA	1600	30 kA	1600	69 kA	1200
		831	42 kA	1600	30 kA	1600	69 kA	1600

❄ Non-time delay fuses (K5).
‡ Consult local codes for proper sizing of short circuit protection.

Electrical Ratings					
				UL/CSA/NEMA	IEC
Control Circuit	Rated Operational Voltage (+10%, –15%)			100…240V AC, 24V AC/DC	100…240V~, 24V AC/DC
	Rated Insulation Voltage			250V	250V~
	Rated Impulse Voltage			—	4 kV
	Dielectric Withstand			1500V AC	2000V~
	Overvoltage Category			—	III*
	Operating Frequency			50/60 Hz	50/60 Hz
	Input onstate voltage minimum, during start (IN1, IN2)			85V AC, 19.2V DC / 19.2V AC	
	Input onstate current (IN1, IN2)			9.8 mA @120V AC/19.6 mA @ 240V AC, 7.3 mA @ 24V AC/DC	
	Input offstate voltage maximum (IN1, IN2)			40V AC, 17V DC / 12V AC	
	Input offstate current @ input offstate voltage (IN1, IN2)			<10 mA, <12 mA	
	Control Power with Fan, during start	3…37 A		215 mA @ 120V AC / 180 mA @ 240V AC, 800 mA @ 24V DC / 660 mA @ 24V AC	
		43…85 A		200 mA @ 120V AC / 100 mA @ 240V AC, 700 mA @ 24V AC/DC	
			Fan Power	**Control Power**	
		108…135 A	20 VA	200 mA @ 120V AC / 120 mA @ 240V AC, 600 mA @ 24V AC/DC	
		201…251 A	40 VA		
		317…480 A	60 VA		
	Control Power without Fan, during start	3…37 A		205 mA @ 120V AC / 145 mA @ 240V AC, 705 mA @ 24V DC / 580 mA @ 24V AC	
Steady State Heat Dissipation and Overload Current Range		Controller Rating (A)		Steady State Heat Dissipation (W)	Overload Current Range (A)
		3		11	1…3
		9		12	3…9
		16		14	5.3…16
		19		15	6.3…19
		25		17	9.2…27.7
		30		19	10…30
		37		24	12.3…37
		43		34	14.3…43
		60		50	20…60
		85		82	28.3…85
		108		62	27…108
		135		75	34…135
		201		129	67…201
		251		147	84…251
		317		174	106…317
		361		194	120…361
		480		239	160…480

Auxiliary Contacts			
		UL/CSA/NEMA	IEC
Rated Operational Voltage		250V AC/30V DC	250V~/30V DC
Rated Insulation Voltage		250V	250V~
Rated Impulse Voltage		—	4 kV
Dielectric Withstand		1500V AC	2000V~
Overvoltage Category		—	III*
Operating Frequency		50/60 Hz	50/60 Hz
Utilization Category		D300/D300	AC-15/DC
TB-97, -98 (OVLD/Fault)	Type of Control Circuit	Electromagnetic relay	
	Number of Contacts	1	
	Type of Contacts	Normally Open (N.O.)	
	Type of Current	AC/DC	
	Rated Operational Current (max.)	0.6 A @ 120V~ and 0.3 A @ 240V~	
	Conventional Thermal Current I_{th}	1 A	
	Make/Break VA	432/72	
TB-13, -14 (Normal/Up-to-Speed)	Type of Control Circuit	Electromagnetic relay	
	Number of Contacts	1	
	Type of Contacts	Normally Open (N.O.)	
	Type of Current	AC/DC	
	Rated Operational Current (max.)	0.6 A @ 120V~ and 0.3 A @ 240V~	
	Conventional Thermal Current I_{th}	1 A	
	Make/Break VA	432/72	

*Overvoltage category II, when either control or auxiliary circuit is wired to a SELV or PELV circuit.

Electrical Ratings			
Side-Mount Auxiliary Contacts			
		UL/CSA/NEMA	IEC
Rated Operational Voltage		250V AC/30V DC	250V AC/30V DC
Rated Insulation Voltage		250V	250V AC
Rated Impulse Voltage		—	4 kV
Dielectric Withstand		1500V AC	2000V AC
Overvoltage Category		—	III*
Operating Frequency		50/60 Hz	50/60 Hz
TB-23, -24 (Normal/Up-to-Speed) TB-33, -34 (Normal/Up-to-Speed)	Utilization Category	C300/R150	AC-15/DC-13
	Type of Control Circuit	Electromagnetic relay	
	Number of Contacts	1	
	Type of Contacts	Normally Open (N.O.)	
	Type of Current	AC/DC	
	Rated Operational Current (max.)	1.5 A @ 120V AC, 0.75A @ 240V AC, 1.17 A @ 24V DC	
	Conventional Thermal Current I_{th}	2.5 A	
	Make/Break VA	1800/180V AC, 28V DC (resistive)	
TB-11, -12 (Normal/Up-to-Speed)	Type of Control Circuit	B300/R300	AC-15/DC-13
	Type of Control Circuit	Electromagnetic relay	
	Number of Contacts	1	
	Type of Contacts	Normally Open (N.O.)	
	Type of Current	AC/DC	
	Rated Operational Current (max.)	3 A @ 120V AC, 1.5A @ 240V AC, 1.17 A @ 24V DC	
	Conventional Thermal Current I_{th}	5 A	
	Make/Break VA	3600/360 V AC, 28V DC (resistive)	

*Overvoltage category II, when either control or auxiliary circuit is wired to a SELV or PELV circuit.

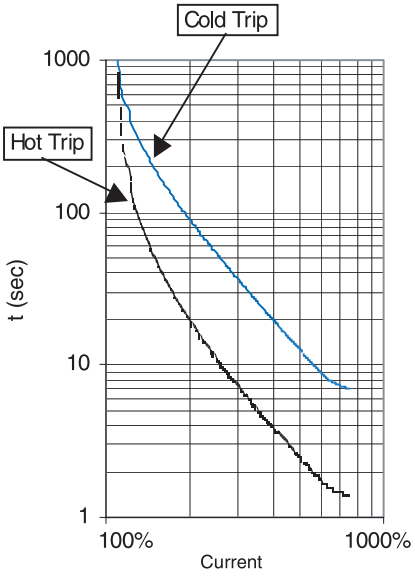
Environmental	
Operating Temperature Range	-5…50 °C (23…122 °F) (open) -5…40 °C (23…104 °F) (enclosed)
Storage and Transportation Temperature Range	-25…85 °C (-13…185 °F)
Altitude	2000 m (6560 ft)
Humidity	5…95% (non-condensing)
Pollution Degree	2
Type of Protection	IP2X

Mechanical Ratings			
Resistance to Vibration	Operational		1.0 G Peak, 0.15 mm (0.006 in.) displacement
	Non-Operational		2.5 G Peak, 0.38 mm (0.015 in.) displacement
Resistance to Shock	Operational		15 G
	Non-Operational		30 G
Line Power Terminals	Cable Size Tightening Torque	3…37 A	2.5…25 mm2 (14…4 AWG) 2.3…2.8 N•m (20…25 in-lbs)
		43…85 A	2.5…95 mm2 (14…3/0 AWG) 11.3…12.4 N•m (100…110 in-lbs)
		108…135 A	23 N•m (200 in-lbs)
		201…251 A	Two M10 x 1.5 diameter holes per power pole
		317…480 A	Two M12 x 1.75 diameter holes per power pole
Load Power Terminals	Cable Size Tightening Torque	3…37 A	2.5…16 mm2 (14…6 AWG) 2.3…2.5 N•m (20…22.5 in-lbs)
		43…85 A	2.5…50 mm2 (14…1 AWG) 11.3…12.4 N•m (100…110 in-lbs)
		108…135 A	23 N•m (200 in-lbs)
		201…251 A	Two M10 x 1.5 diameter holes per power pole
		317…480 A	Two M12 x 1.75 diameter holes per power pole
Control Terminals	Cable Size Tightening Torque	All	0.2…2.5 mm2 (24…14 AWG) 0.5…0.9 N•m (4.4…8.0 in-lbs)

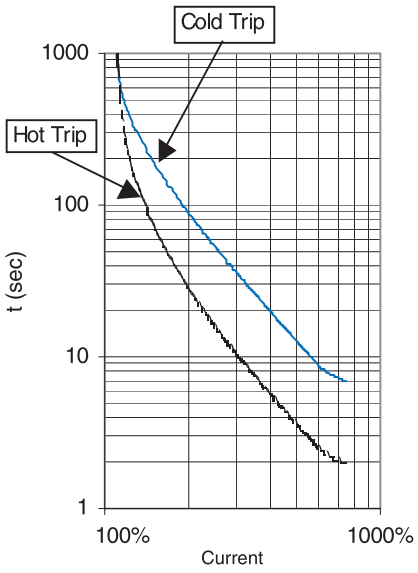
Other			
		UL/CSA/NEMA	IEC
EMC Emission Levels	Conducted Radio Frequency Emissions	—	Class A
	Radiated Emissions	—	Class A
EMC Immunity Levels	Electrostatic Discharge	4 kV Contact and 8 kV Air Discharge	8 kV Air Discharge
	Radio Frequency Electromagnetic Field	—	Per EN/IEC 60947-4-2
	Fast Transient	—	Per EN/IEC 60947-4-2
	Surge Transient	—	Per EN/IEC 60947-4-2

SMC-3 Overload Trip Curves

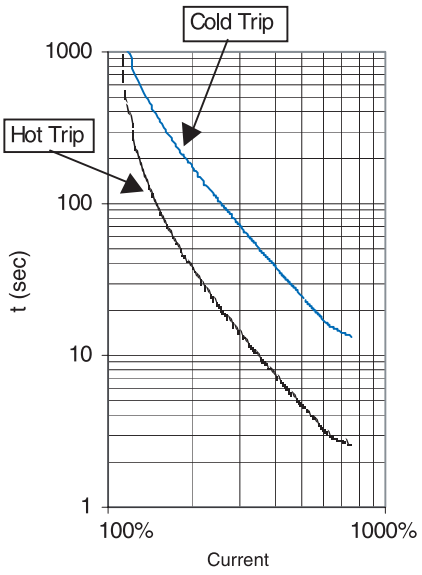
Trip Class 10



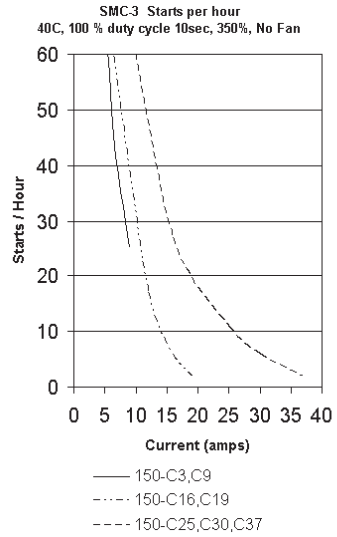
Trip Class 15

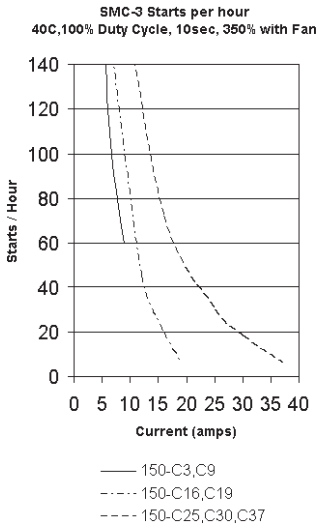


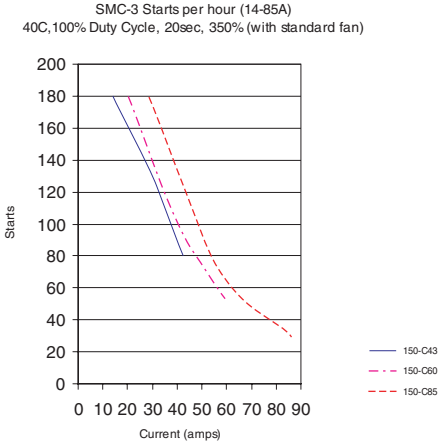
Trip Class 20

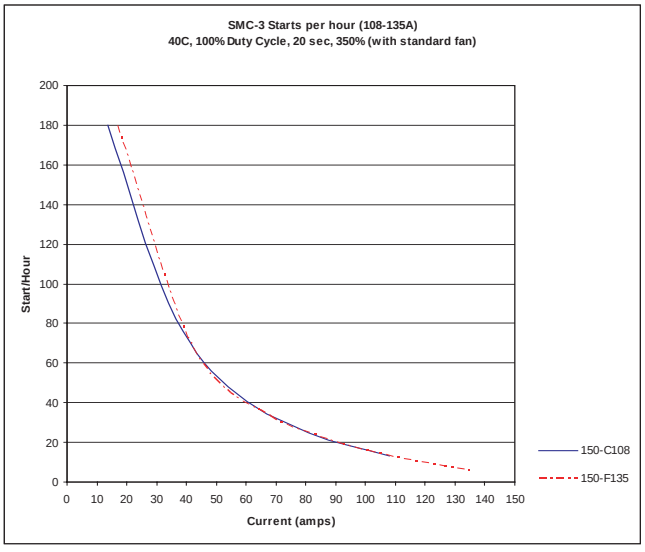


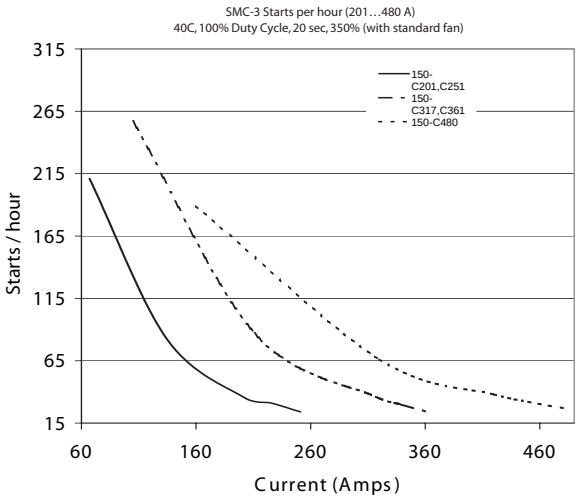
Starts per Hour Curves





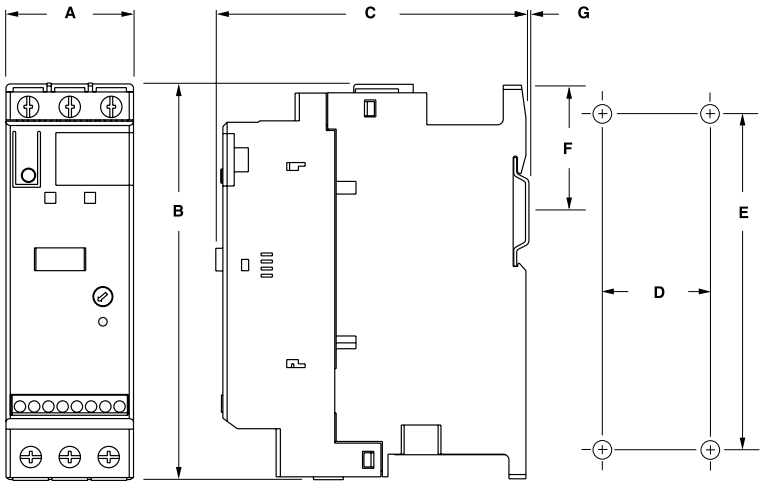






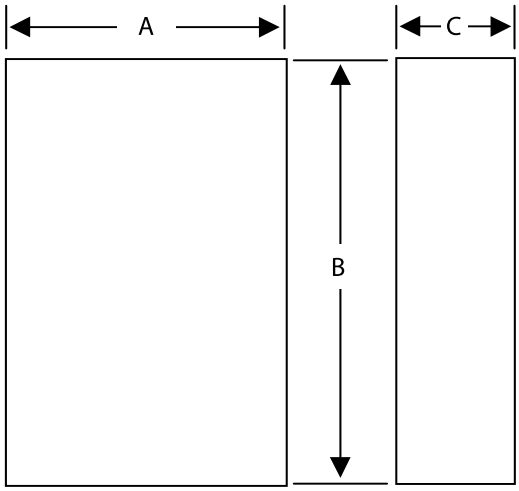
Dimensions in millimeters (inches). Dimensions are not intended to be used for manufacturing purposes. All dimensions are subject to change.

Open Type



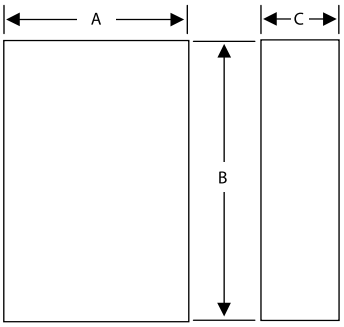
Rating (A)	A	B	C	D	E	F	G	Mounting Hole Size	Weight kg (lbs)
1…37	44.8 (1-49/64)	139.7 (5-1/2)	100 (4-21/64)	35 (1-3/8)	132 (5-13/64)	46.4 (1.81)	2 (1/16)	4.6 (0.18)	0.86 (1.9)
43…85	72 (2.83)	206 (8.11)	130 (5.12)	55 (2.17)	198 (7.8)	102 (4.02)	2 (1/16)	5.3 (0.21)	2.25 (5.0)
108…135	196.4 (7.74)	443.7 (17.47)	205.2 (8.08)	166.6 (6.56)	367 (14.45)	—	—	7.5 (0.295)	15 (33)
201…251	225 (8.86)	560 (22.05)	265.3 (10.45)	150 (5.91)	504.1 (19.85)	—	—	11.5 (0.45)	30.4 (67)
317…480	290 (11.42)	600 (23.62)	298 (11.73)	200 (7.87)	539.2 (21.23)	—	—	11.5 (0.45)	45.8 (101)

Minimum Enclosure Size



Controller	A Width	B Height	C Depth	Fan Requirements
1…37 A	224 (9)	305 (12)	152 (6)	none
43…85 A	406 (16)	305 (12)	203 (8)	none
108…135 A	762 (30)	610 (24)	305 (12)	none
201…251 A	965 (38)	762 (30)	356 (14)	none
317…480 A	1295 (51)	914 (36)	356 (14)	none

Enclosed Type Line-Connected Controllers



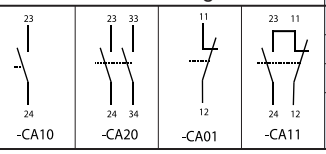
Controller Rating (A)	Disconnect Rating (A)	IP65 (Type 4/12)		
		B Height	A Width	C Depth
Non-Combination Controller				
3	—	305 (12)	305 (12)	152 (6)
9	—	305 (12)	305 (12)	152 (6)
16	—	305 (12)	305 (12)	152 (6)
25	—	305 (12)	305 (12)	152 (6)
30	—	305 (12)	305 (12)	152 (6)
37	—	305 (12)	305 (12)	152 (6)
43	—	356 (14)	406 (16)	203 (8)
60	—	356 (14)	406 (16)	203 (8)
85	—	356 (14)	406 (16)	203 (8)
108	—	762 (30)	610 (24)	305 (12)
135	—	762 (30)	610 (24)	305 (12)
201	—	965 (38)	762 (30)	356 (14)
251	—	965 (38)	762 (30)	356 (14)
317	—	1295 (51)	914 (36)	356 (14)
361	—	1295 (51)	914 (36)	356 (14)
480	—	1295 (51)	914 (36)	356 (14)
Combination Controllers with Fusible Disconnect				
3	30 A/J	356 (14)	406 (16)	203 (8)
9	30 A/J	356 (14)	406 (16)	203 (8)
16	30 A/J	356 (14)	406 (16)	203 (8)
25	30 A/J	356 (14)	406 (16)	203 (8)
30	60 A/J	356 (14)	406 (16)	203 (8)
37	60 A/J	356 (14)	406 (16)	203 (8)
43	60 A/J	356 (14)	406 (16)	203 (8)
60	100 A/J	610 (24)	406 (16)	254 (10)
85✶	100 A/J	610 (24)	406 (16)	254 (10)
85❄	100 A/J	762 (30)	610 (24)	305 (12)
108	200 A/J	965 (38)	762 (30)	356 (14)
135	200 A/J	965 (38)	762 (30)	356 (14)
201	400 A/J	965 (38)	762 (30)	356 (14)
251	400 A/J	965 (38)	762 (30)	356 (14)
317	600 A/J	1524 (60)	965 (38)	356 (14)
361	600 A/J	1524 (60)	965 (38)	356 (14)
480	600 A/J	1524 (60)	965 (38)	356 (14)
Combination Controllers with Circuit Breaker				
3	15 A	356 (14)	406 (16)	203 (8)
9	15 A	356 (14)	406 (16)	203 (8)
16	20 A	356 (14)	406 (16)	203 (8)
25	30 A	356 (14)	406 (16)	203 (8)
30	40 A	356 (14)	406 (16)	203 (8)
37	50 A	356 (14)	406 (16)	203 (8)
43	80 A	610 (24)	406 (16)	254 (10)
60	100 A	610 (24)	406 (16)	254 (10)
85	125 A	610 (24)	406 (16)	254 (10)
108	175 A/175 A Plug	965 (38)	762 (30)	356 (14)
135	225 A/225 A Plug	965 (38)	762 (30)	356 (14)
201	300 A/300 A Plug	965 (38)	762 (30)	356 (14)
251	400 A/400 A Plug	965 (38)	762 (30)	356 (14)
317	600 A/600 A Plug	1295 (51)	914 (36)	356 (14)
361	600 A/600 A Plug	1295 (51)	914 (36)	356 (14)
480	800 A/800 A Plug	1295 (51)	914 (36)	356 (14)

✶ Dimensions for FHD-43, FAD-44, FBD-47, and FCD-48.
❄ Dimensions for FHD-44, FAD-45, FBD-48, and FCD-49

Enclosed Options

Option	Description		Cat. No. Modification
Push Buttons	Start-Stop Push Button		-1
Selector Switch	Hand-Off-Auto Selector Switch		-3
Pilot Light	Transformer Pilot Light - Red Run Indicator		-4R
Control Circuit Transformer	Control Circuit Transformer (fused primary and secondary)		-6P
Protective Module	480V Line Side Protective Module	3…480 A	-8L
	600V Line Side Protective Module	3…480 A	
	480V Load Side Protective Module	43…480 A	-8M
	600V Load Side Protective Module	43…480 A	
	480V Both Line and Load Side Protective Module	43…480 A	-8B
	600V Both Line and Load Side Protective Module	43…480 A	
Auxiliary Contacts	1 N.O. auxiliary contact	for 3…480 A units	-90
	2 N.O. auxiliary contacts	for 3…480 A units	-900
	1 N.O. and 1 N.C. auxiliary contacts	for 3…480 A units	-901
Disconnect Auxiliary	N.O. disconnect auxiliary mounted on the operating mechanism		-98
	N.C. disconnect auxiliary mounted on the operating mechanism		-99

Accessories

Description	N.O.	N.C.	Connection Diagram	Cat. No.
Auxiliary Contact Blocks for Side Mounting with Sequence Terminal Designations 1- and 2-pole Quick and easy mounting without tools One block per device only	1	0		150-CA10
	2	0		150-CA20
	0	1		150-CA01
	1	1		150-CA11 (Form C)

Description		For Use With	Pkg. Qty.	Cat. No.
Fan Field installed	Optional	150-C3…37 150-D3…64	1	150-CF64
	Replacement	150-C43…85/150-D74…147		150-CF147
		150-C108, 150-C135		41391-801-03
		150-C201, 150-C251		41391-801-01
		150-C317…C480		41391-801-02
Connecting modules to 140-M Electrical interconnection between SMC-Delta/SMC-3 and 140-M. Motor protector and SMC must be mounted separately.	Connects 140-M-C to 150-C3…25/150-D3…25		1	150-CC25
	Connects 140-M-D to 150-C3…25/150-D3…25		1	150-CD25
	Connects 140-M-F to 150-C3…37/150-D3…32		1	150-CF45
Connecting modules to 100-C Electrical interconnection between SMC-Delta/SMC-3 and 100-C. Contactor and SMC must be mounted separately.	Connects 100-C09…23 to 150-C3…19/150-D3…20		1	150-CI23
	Connects 100-C30…37 to 150-C3…37/150-D3…32		1	150-CI37

Description		For Use With	Pkg. Qty.	Cat. No.
	480V Protective Module	150-C3…37NB or 150-D3…64NB (line only)	1	150-C84
		150-C43…85NB (line and/or load) or 150-D74…147NB (line only)	1	150-C84P
		150-C108…480NB (line and/or load)	1	150-F84L
	600V Protective Module	150-C3…37NC or 150-D3…64NC (line only)	1	150-C86
		150-C43…85NC (line and/or load) or 150-D74…147NC (line only)	1	150-C86P
		150-C108…480NC (line and/or load)	1	150-F86L
	Terminal Cover IEC line or load terminal covers for 108…480 A devices. Dead front protection	150-C108…135	1	150-TC1
		150-C201…251	1	150-TC2
		150-C317…480	1	150-TC3

	Current Rating (A) ❄	Wire Size	Total No. of Line Controller Terminal Lugs Possible Each Side		Pkg. Qty.	Cat. No.
			Line Side	Load Side		
	108…135♣	#6…250 MCM AWG 16 mm²…120 mm²	3	3	3	199-LF1
	201…251♣		6	6		
	317…480♣	#4…500 MCM AWG 25 mm²…240 mm²	6	6		199-LG1

Line and Load terminals are provided as standard on enclosed SMCs.
❄ 1…85 A units have box lugs standard. No additional lugs are required.
♣ When a multi-conductor lug is required, refer to the Instruction Sheet for appropriate lug catalog number.

Description		For Use With	Pkg. Qty.	Cat. No.
	Marking Tag Sheet 10 sheets with 160 perforated paper labels each, 6 x 17 mm To be used with a transparent cover	150-C, 150-D	10	100-FMP
	Transparent Cover 100 each To be used with marking tag sheets	150-C, 150-D	100	100-FMC
	Remote Reset Solenoid for remote reset of electronic overload	150-C, 150-D	1	193-ER1⊗

⊗ Voltage Suffix Code

Available Coil Voltages 12… 600V 50 Hz/12…600V 60 Hz
Standard Coil Voltages

Voltage	24	48	110	115	120	220	240
50 Hz	J	—	D	—	—	A	—
60 Hz	J	—	—	—	D	—	A
DC	Z24	Z48	—	Z01	—	—	—

Surcharge for special voltages up to 20 pcs. (no surcharge for quantities greater than 20 pcs.)

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